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ABSTRACT

The study utilized standardized testing procedures to identify the reading comprehension and verbal language characteristics of 12 fourth and fifth grade disabled readers. Reading comprehension was assessed with a standardized test of reading comprehension. Verbal language was assessed with a standardized test of verbal language. Descriptive, correlational, and inferential statistical procedures were utilized to analyze the data. Graphic comparisons of individual verbal languge scores of the study group to the verbal language test norms isolated a language disorder subgroup of eight children. Pearson Product-Moment correlations between the 16 reading comprehension and verbal language variables resulted in two significant negative correlations. Spearman rho correlations between the same 16 reading and language variables for the language disorder subgroup yielded three significant positive coefficients and two significant negative coefficients. Reading comprehension in general was found to be significantly related to performance in verbal expression, specifically syntax. When the reading comprehension and verbal language mean scores of the study group were compared to the projected appropriate means on the reading comprehensions and verbal language tests, statistically significant differences were found. (Author/CL)

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AN ANALYSIS OF THE LINGUISTIC AND READING COMPREHENSION ABILITIES OF SEVERELY READING DISABLED SCHOOL AGED CHILDREN

by

JOHN MICHAEL TRACY

A DISSERTATION

Presented to the Division of Special Education and Rehabilitation
and the Graduate School of the University of Oregon
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

June 1983

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An Abstract of the Dissertation of
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in the Division of Special Education and Rehabilitation
to be taken June 1983

Title: AN ANALYSIS OF THE LINGUISTIC AND READING COMPREHENSION ABILITIES OF SEVERELY READING DISABLED SCHOOL AGED CHILDREN

Approved: Ann Palmer Curtis
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This study utilized standardized testing procedures to identify the reading comprehension and verbal language characteristics of a group of fourth and fifth grade disabled readers. A screening process was used to narrow the original subject group of thirty-one children to a study group of twelve children with normal vision, hearing, intelligence, and visual perception. Reading comprehension was assessed with a standardized test of reading comprehension. Verbal language was assessed with a standardized test of verbal language.

Descriptive, correlational, and inferential statistical procedures were utilized to analyze the data. Graphic comparisons of individual verbal language scores of the study group to the verbal language test norms isolated a language disorder subgroup of eight children. Pearson Product-Moment correlations between the sixteen reading comprehension and verbal language variables resulted in two significant negative correlations. Spearman rho correlations between the same sixteen reading and language variables for the language disorder subgroup yielded three significant positive coefficients and two significant negative coefficients. Reading comprehension in general was found to be significantly related to performance in verbal expression, specifically syntax. When the reading comprehension and verbal language mean scores of the study group were compared to the projected appropriate means on the reading comprehension and verbal language tests, statistically significant differences were found.

These results were discussed in light of the single and multiple causation theories of reading disabilities. Implications of the results for diagnosis and intervention with upper elementary grade reading disabled children were also discussed.

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DEDICATION

This study is dedicated with love to my wife Diane, whose typing and editing made this study a reality in its final form. And whose continual support in countless ways was a major force in the completion of my doctoral program.

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CHAPTER I

INTRODUCTION

The incidence of developmental reading disability in the United States is estimated to be twenty-five million. In an article on dyslexia, Drake Duane, a neurologist at the Mayo clinic, stated that dyslexia is "... a greater health problem than the combined occurrence of mental retardation, cerebral palsy and epilepsy" (Newsweek, 1982, p.55).

Myklebust (1978) has indicated that past research on reading disabilities has failed to delineate between dyslexia and other reading problems. This is due to lack of differentiation between reading problems that are due to linguistic deficiencies and reading problems that are due to non-linguistic deficiencies. He believes that dyslexia is a, "... cognitive disorder involving the read form of language" (p.10). His hypothesis has been supported by Vellutino (1979) who concluded that the etiology of dyslexia is a verbal processing disorder.

One of the major problems facing the researcher in developmental reading disabilities is the question of whether more than one type of reading problem exists (Gibson and Levin, 1975). In his address to the

International Reading Association, Aaron (1980) revealed that dyslexia is not a unitary syndrome. Dyslexia may be due to pathological functioning in either the verbal language or visual-spatial-perceptual systems. He recommended further research directed toward a description of the subtypes of dyslexia. Harris (1982), after reviewing the literature on reading disability, stated that the focus of research in this area has been on finding a single factor that differentiated reading impaired from normal readers. He concluded that the problem with this type of research is that the diverse characteristics to be found within a group of reading handicapped children are lost due to averaging.

Numerous authors have identified subgroups within larger populations of reading disabled children (Bronner, 1919; Monroe, 1932; Rabinovitch, 1959; Myklebust, 1965; Boder, 1971; Mattis, 1975; Pirozzolo, 1979).

Pirozzolo (1979) reviewed the literature on developmental dyslexia and concluded that at least two dyslexic syndromes could be identified. The first, auditory-linguistic dyslexia, manifested through verbal language deficiencies. The second, visual-spatial dyslexia, is manifested through visual-perceptual deficiencies. He differentiated the two syndromes in eye movement studies. He also employed two single case studies, each case exhibiting one of the dyslexic syndromes.

There continues to be confusion concerning the cause of reading problems. Gibson and Levin (1975) have indicated that for every child with a reading disability, there is a separate etiology. However, careful study of developmental dyslexia by Pirozzolo (1979) has shown that two syndromes of dyslexia can be delineated. These include auditory-linguistic dyslexia and visual-spatial dyslexia. Aaron (1980) has stated that future research on reading disabilities should focus on a description of the subgroups of dyslexia. This new direction of research would inevitably lead to a better understanding of developmental reading problems and may foster new approaches to teaching reading handicapped children.

CHAPTER II

REVIEW OF THE LITERATURE

The focus of this chapter is concepts related to reading disability, an overview of the literature in reading disability, and the statement of the problem. In his 1980 address to the International Reading Association, Aaron stated that dyslexia is a complex syndrome that has been investigated by researchers from numerous disciplines within the behavioral and medical sciences. The purpose of this study is to describe the verbal language and reading comprehension characteristics of a group of fourth and fifth grade reading disabled children. In accordance with this intent, journals, texts, and dissertations in the areas of remedial reading, reading behavior, communication disorders, cognitive psychology, developmental psychology, neuropsychology, developmental medicine, and neurology were reviewed. The result of this literature review is the following three sections: Theoretical Views of Reading Disabilities Prior to 1960, Syndromologies of Dyslexia, and the Relationship of Verbal Language Disorder to Reading Disability.

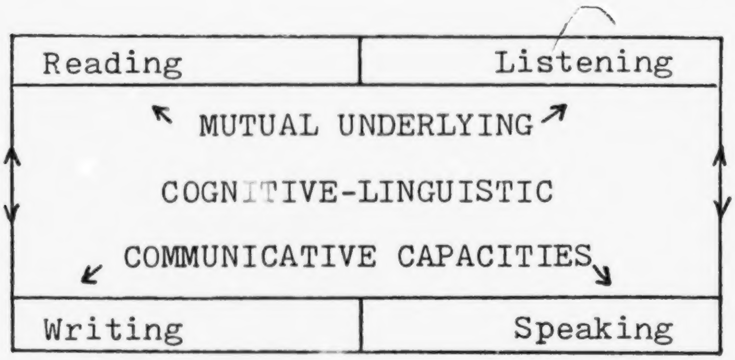
Concepts Related to Developmental Reading Disabilities

Learning to read is influenced by physical, cognitive, linguistic, and social development. Critical periods of development have been postulated in the child psychology literature (Piaget & Inhelder, 1969). Pathological disturbances during any of the critical developmental periods are believed to have a negative effect on the acquisition of these skills later in life (Mussen, Conger & Kagan, 1969).

Verbal language learning is a developmental process in which the phonological, semantic, syntactic, and pragmatic aspects are constantly being refined. Emergence of verbal language has been viewed as, "... a gradual unfolding of capacities in a series of more or less well-circumscribed events that take place between birth and $3\frac{1}{2}$ years of age" (Marge, 1972, p.80). Growth in verbal language behavior is governed by periods of readiness that are mediated by hereditary, maturational, and environmental variables (Lenneberg, 1966).

Acquisition of verbal language in the areas of phonology, semantics, syntax, and pragmatics is of utmost importance as a basis for reading (Eisenberg, 1978; Stark, 1975; Stark, 1981). Reading is believed to be a visual-linguistic process that is overlaid on verbal language (Mattingly, 1972; Gibson & Levin, 1975; Brown, 1980). Muma (1981) has expressed the relationship of reading to language in the model which follows.

Figure 1. Support of Linguistic Functions by Cognitive-Linguistic Systems (Muma, 1981)


Reading
Listening
MUTUAL UNDERLYING
COGNITIVE-LINGUISTIC
COMMUNICATIVE CAPACITIES
Writing
Speaking

Reading is a linguistic process. Adequacy in reading is dependent on normal verbal language development (Muma, 1981).

Delayed Verbal Language Development

Adequacy in verbal language is basic to the intellectual and social-emotional development of the child. A delay in verbal language development is believed to render the child unable to meet the linguistic demands of the academic environment. Success in reading requires adequate growth in verbal language (Marge, 1972; Myklebust, 1978; Muma, 1981). Marge (1972) has differentiated between developmental and acquired language disabilities. Regarding developmental language disabilities Marge (1972) stated:

> Children whose language acquisition is below levels attained by their age peers in their speech community. The delay may occur in all, one, some combination of the phonological, semantic and syntactic components of the language of their speech community. (pp.85 & 86)

An acquired language disability has been defined by Marge (1972) as,

> members of a speech community who had at some point in their developmental history acquired the language of their speech community, who subsequent to such adequate language acquisition suffered a complete loss or reduction in their capacity to use the language common to their speech community. (p.86)

A delay in language acquisition or a loss of language will have deleterious effects on a child's ability to function at the level of his/her peers both intellectually and socially. The child with a language disability will lag behind others in academic subjects that require language-learning skills; i.e. listening, speaking, reading, and writing (Donahue, Pearl and Brian, 1982).

Reading

Reading is a complex process that is difficult to define (Smith, 1978; Hasenstab and Laughton, 1982). Layton (1979) refers to past attempts to define reading.

> Observers have noted that children usually learn to read when taught, but those who have attempted to explain the exact process have experienced difficulty. (p.81)

He concluded that reading continues to escape explanation despite the numerous models of reading that have been designed. He further stated that the major problems with definitions of reading have been incompatible interpretations of terms, including reading, and other variables that occur as a child reads.

Gibson and Levin (1975) selected a different approach to defining reading. They defined reading simply as, "... extracting information from text" (p.5). However, they utilized the major portion of their text on the psychology of reading for an in-depth description of reading. Carroll (1970) listed eight skills a reader must develop in order to read. These skills include: 1) knowledge of one's native language; 2) word analysis skills; 3) letter discrimination; 4) visual scanning from left to right; 5) prediction of highly probable letter sound correspondences; 6) use of available cues, letters, word shapes and context, in word recognition; 7) knowledge that printed and spoken words are semantic equivalents; and, 8) use of reflection to think about what has been read.

The definition of reading offered by Rutter (1978) best describes the linguistic/communicative nature of reading. "Reading, as much as speech, is essentially a language code utilized for communication between people" (p .7). Later in his discussion on reading, he narrows the definition of reading to be specific to visual-linguistic processing. He states, "... reading is a linguistic skill which requires the understanding of a code of visual symbols used to convey meaning" (p.7). Reading appears to be a complex cognitive-linguistic process that is utilized in communication between a reader and a writer.

Reading Disability

Like reading, there are many definitions of a reading disability. This is due to the complexity of the cognitive-linguistic processes underlying reading and their function during reading. The magnitude of this problem is reflected in the number of descriptors utilized in the literature on reading problems. Gibson and Levin (1975) cited five different terms utilized to describe the child having reading difficulties. These terms included specific reading disability, reading retardation, word blindness, reading disorder, and dyslexia. Since the purpose of this study is to describe the verbal language and reading comprehension characteristics of children having reading problems the author will utilize the following definition of reading disability from Mattis (1978):

> ... the presence of atypical reading development as compared to that of other children of similar age, intelligence, instructional program, and socio-cultural opportunity, which without intervention, is expected to persist and is due to a well defined defect in any one of several higher cortical functions. (p.58)

All terms utilized in this study that refer to reading problems are intended to be synonymous with the term dyslexia.

Syndromes of Dyslexia

Aaron (1980) offered an explanation regarding why researchers have been unable to adequately describe the scope of developmental reading problems. He concluded that researchers have not recognized the existence of more than one type of dyslexia. Pirozzolo (1979) has identified and described two dyslexic syndromes. He termed the first, auditory-linguistic dyslexia. This syndrome is characterized by disturbances in verbal language learning. The second syndrome was termed, visual-spatial dyslexia. He observed that visual-spatial dyslexia was manifested through deficiencies in visual-perceptual, visual-spatial, and oculomotor functioning.

Theoretical Views of Reading Disabilities Prior to 1960

According to Thompson (1966) the earliest researcher to publish a report on reading disabilities was the English ophthalmologist, W. Pringle Morgan. In 1896 Morgan presented a case study that focused on a fourteen year old boy who was experiencing a specific type of educational problem. Despite normal visual acuity, adequate peripheral vision, normal neurological examination, and normal intelligence, the boy was unable to read. After consideration of the evaluation results, Morgan hypothesized the cause of the reading problem to be delayed cerebral development, specific to the angular gyrus. This led Morgan to label the boy's dysfunction as congenital word-blindness (cited in Thompson, 1966).

During the late nineteenth and early twentieth centuries, a Scottish ophthalmologist, James Hinshelwood, published works on dyslexia. Thompson (1966) viewed Hinshelwood as a leader in the field of reading disability for two decades. In an earlier article, "Congenital Word-blindness", Hinshelwood (1900) provided a description of two individuals who demonstrated a severe impairment in their ability to read. A review of Morgan's earlier publication (1896) was also provided in Hinshelwood's article. Hinshelwood agreed with Morgan's findings that reading deficits were due to involvement of the angular gyrus in the left cerebral hemisphere. This involved site was presumed to be the result of disease, birth trauma or a lag in growth/development of the left cerebral hemisphere. Hinshelwood (1900) stated that reading disabilities were not unusual among school children. The number of students identified was minimal historically. This reportedly was due to a common belief among teachers that anyone unable to read had subnormal intelligence (cited in Thompson, 1966).

Hinshelwood continued to write and speak about congenital word-blindness. A 1917 monograph entitled, Congenital Word-blindness, was described by Thompson (1966) as a landmark in the history of reading disability. This work was an update of Hinshelwood's research with reading handicapped children. Hinshelwood again concluded that difficulty with learning to read was due to a subtle injury to the angular gyrus in the left cerebral hemisphere or to a delay in development of the left cerebral hemisphere.

The first published study on childhood reading disability in the United States was authored by J.H. Claiborne, a New York ophthalmologist. The article, "Types of Congenital Symbol Amblyopia", appeared in the Journal of the American Medical Association in 1906. Summarizing his research with two children having severe reading problems, Claiborne argued that the European term "blindness" was an inappropriate label for the deficits exhibited by his subjects. He proposed a more accurate descriptor, "Amblyopia". Claiborne described his subjects problem as amblyopia, or blurred vision. This type of response was found for all printed text presented by Claiborne to his subjects. Like other authors, Claiborne believed that amblyopia was due to a congenital lesion in the area of the brain responsible for the storage and retrieval of letters and words (cited in Thompson, 1966).

Bronner (1919) was the first to identify children who exhibited severe reading deficits and severe impairments in other cognitive processes besides vision. A chapter entitled "Special Defects in Language Ability" included a discussion of deficiencies in two individual cases. One had auditory memory, discrimination, and expressive language defects. The other case had problems in the expression of grammatically appropriate sentences. Both children were found to have adequate ability to construct complex puzzles and also to respond accurately to form discrimination tasks. Bronner concluded that more research was needed to understand the relationship between the physiology of the visual system and deficits of reading. He further emphasized that research efforts should be directed toward a broadened understanding of the roles that language comprehension and production play in learning to read.

The neurologist Samuel Orton was a well known early researcher in the field of dyslexia. Orton's theory of dyslexia has been described by Vellutino (1979) as, "... comprehensive ... and one of the few that has generated testable hypotheses" (p.38). Orton published numerous accounts regarding his theory of reading disability (1928, 1929, 1937, 1946). His original paper (1925), "Word-blindness in School Children", contains a comprehensive discussion of his theory of the cause of dyslexia. Because of the thoroughness and detail of Orton's accurately depicted accounts of his own theorizing, the author has selected this historically relevant work for indepth review. Orton presents diagnostic information for a sixteen-year-old boy and other students who were referred to a rural outreach clinic conducted by the Iowa State Psychopathic Hospital. These children were referred to this clinic for evaluation of their apparent learning handicaps. The sixteen-year-old was unique among the others in that he exhibited all of the classical symptoms of congenital word-blindness described by Hinshelwood in 1900. At the conclusion of the outreach clinic the boy accompanied Orton to the Psychopathic Hospital for admission to allow for comprehensive physical, psychological, and educational assessments (Orton, 1925). The evaluations conducted by Orton and the other staff members at the Psychopathic Hospital revealed the following findings: 1) an intelligence quotient (I.Q.) of 86 (dull normal); 2) normal visual acuity and color vision; 3) a high level of accuracy on picture completion, mechanical assembly and puzzle box tasks; 4) ability to name objects, letters of the alphabet, and numbers with no difficulty; 5) ability to read only monosyllabic words; 6) a right-left reading confusion for words, i.e. was vs. saw; 7) letter reversal problem, i.e. p vs. b; and, 8) normal results from a neurological examination. Based on these findings, Orton (1925) conjectured that this person's reading problem was due to difficulty with letter-symbol association at the symbolic level of the visual system.

Orton (1925) also considered the assessment results from fourteen other learning handicapped children who were referred to the rural outreach clinic. Test results were also examined from patients with educational problems who were evaluated in the outpatient department of the Psychopathic Hospital. He found that all subjects demonstrated normal intelligence, normal neurological functioning, but abnormal reading abilities. These patients read from right to left and consistently reversed the letters p and b. Many of these individuals had mixed hand dominance. Based on these assessment findings Orton concluded that learning to read was a developmental process related to cerebral dominance. He believed that cerebral dominance for printed linguistic stimuli developed during the early school years as a result of exposure to print. The dominant hemisphere continually suppresses mirror images of letters and words received by the nondominant hemisphere. This belief led Orton to further hypothesize that a delay in the establishment of cerebral hemisphere dominance was the underlying physiological etiology of dyslexia.

Monroe (1932) compared a group of 415 reading disabled children ages 6 years to 16 years, 11 months to 101 normal readers ages 6 years to 10 years, 11 months. Numerous assessments of the two groups were undertaken. The goal of assessment was to explain the mechanisms underlying reading disabilities. Monroe's reading disabled subjects were divided into three subgroups. Groupings were based on past history and referral source. The first subgroup was designated, "the clinic reading group". These individuals had severe behavioral and reading problems. They were referred by social welfare agencies and the courts. Subgroup one subjects' mean I.Q. was 90.4. The mean discrepancy between grade level and reading level was 3.49 years. The second subgroup was termed the "special reading cases". Because of severe reading problems, these individuals were referred by their parents, teachers and school psychologists, Their mean I.Q. was 100.9. The mean discrepancy between grade level and reading level was below 2.94 years. The third subgroup was called the "defective reading cases". These individuals were referred by their special education teachers. The referral was based on a myriad of educational problems. The subjects' mean I.Q. was 77.4. The mean discrepancy between grade level and reading level was reported as 5.86 years. These three groups were compared to a control group of average achieving students. The normal achieving subjects ranged in age from 6 years to 10 years, 11 months. Their mean I.Q. was 111.4. The mean discrepancy between grade level and reading level was slightly higher than three months. Although Monroe analyzed a number of variables, the quantitative and qualitative analyses of the speech disorders found in the control and experimental groups is pertinent to this review. Quantification of speech disorders during the evaluation sessions showed that twenty-seven percent of those with reading disabilities had a speech problem, however only eight percent of the control group had a speech problem. Monroe and her staff also made informal observations of the receptive and expressive language abilities of all participants in the study. They found that twenty-seven percent of the reading disabled subjects with speech problems spoke in simple sentences of the subject-predicate type. Subjects also demonstrated limited language comprehension and expression abilities. The author concluded that, "Defective speech may be considered a factor in reading disability, either as one cause of the reading defect or as a result of a common cause" (p.92).

Rabinovitch (1959) recognized reading problems in a group of children who did not have emotional disorders or reported brain damage. He labeled these reading problems as primary reading retardation and secondary reading retardation. Primary reading retardation was characterized by a Performance-Verbal I.Q. discrepancy on the Wechsler Intelligence Scale for Children (1949) (WISC) of at least twenty points in favor of Performance. The second category, secondary reading retardation, included children who exhibited specific neurological signs and/or behavioral symptoms indicative of brain damage and emotional dysfunction, respectively. The author concluded, "There is a general verbal incapacity relative to intellectual potential of primary nonreaders" (p. 866).

Three conclusions about the research reviewed on reading disability prior to 1960 can be made. The first is that the earliest studies employed a small number of subjects. The second is that dyslexia was due to a developmental delay in cerebral dominance or cerebral pathology. The third is that dyslexia is the result of a specific developmental delay in one or more of the cognitive processes.

Syndromologies of Dyslexia

Historically, the common etiological factor underlying reading problems was believed to be a neurological lesion, or delayed neurological development of the angular gyrus in the left cerebral hemisphere. This pathological condition was responsible for an individual's problem processing visual stimuli (i.e. printed material) (Morgan, 1896; Hinshelwood, 1900; Orton, 1925). Other authors (Bronner, 1919; Monroe, 1932; Rabinovitch, 1959) have sought to identify cognitive and linguistic processes underlying reading disabilities. This research has been specifically undertaken to investigate the auditory and visual receptive systems and the oral and manual expressive systems. The research results have revealed the existence of more than one syndrome underlying dyslexia.

Kinsbourne and Warrington (1963) studied the neurological, linguistic, and perceptual functioning of thirteen severe-reading disabled children. These subjects were assigned to separate subgroups based on Verbal-Performance I.Q. discrepancies on the WISC and the Wechsler Adult Intelligence Scale (WAIS) (Wechsler, 1955). All subjects with the exception of one (31 years) ranged in age from 8 years to 11 years. Group one, language retarded, was composed of six individuals who had a Verbal-Performance I.Q. discrepancy of at least 20 points in favor of Performance. Group two, Gerstmann (Developmental Syndrome), was composed of seven persons who had a Verbal-Performance I.Q. discrepancy of twenty points in favor of Verbal. The subjects were observed for signs of neurological pathologies, receptive and/or expressive language deficiencies, spatial disorientation, drawing-copying (designs, letters, words) difficulties, and mechanical arithmetic problems. In addition, the following measures were administered: WISC, WAIS, tests of reading and spelling, and tests of finger differentiation and order. The results of the observations and testing for the language disorder subgroup included abnormal performance scores for language and speech tasks concomitant with a history of delayed language development. Case histories for these subjects showed normal motor development. Visual spatial abilities were also found to be within normal limits. One member of this group exhibited positive neurological findings. The Gerstmann subgroup had no speech or language problems, but showed delayed motor development, insufficient constructional ability, right-left disorientation, difficulties in finger differentiation and order, and problems with mechanical arithmetic. This subgroup contained the highest incidence of neurological pathologies. Kinsbourne and Warrington concluded that at least two types of syndromes could be found in a group of severely reading handicapped subjects. These included: 1) language disordered and 2) Gerstmann (visual-spatial problems). These findings support the use of the WISC or WAIS Verbal-Performance I.Q. discrepancy score for differential diagnosis of subgroups with dyslexia.

In a study comparing third and fourth grade disabled readers and normal readers, Wolf (1969) found three dyslexic syndrome patterns. All subjects were middle class. The subjects had no medical or emotional problems, and above average intelligence. The reading handicapped participants were at least one grade level below the normal readers in reading and spelling. Both groups were evaluated on 197 variables derived from the following ten categories: 1) intelligence; 2) education (reading, writing, spelling, and math); 3) visual perception; 4) auditory perception; 5) speech; 6) psychoneurological; 7) neurological; 8) electroencephalograms; 9) medical history; and 10) familial history of language disability. Results of evaluations performed for each of the ten categories were analyzed with simple analysis of variance, intercorrelations of significant variables, factor analyses and hierarchial grouping analyses. Wolf found forty-three significant variables, fourteen significant factors, and three reading disability syndrome patterns.

Boder (1970) developed a screening test that identified specific reading and spelling patterns of school age and adolescent disabled readers. The instrument was designed to aid in the differential diagnosis of dyslexia types. Boder's idea of disparate groups of disabled readers was derived from earlier research by Myklebust (1965). The intent of her research was to identify two types of dyslexia, auditory and visual. After evaluating and observing the reading and spelling patterns of subjects with reading problems, Boder derived the following categories of dyslexia: 1) dysphonetic dyslexia; 2) dyseidetic dyslexia; and 3) mixed dysphonetic-dyseidetic dyslexia. Dysphonetic dyslexia was characterized by reading and spelling patterns that reflect deficiencies in sound-symbol associations. Dyseidetic dyslexia was characterized by reading and spelling patterns that reflect a deficiency in the perception of letters and words as whole configurations. Mixed dysphonetic-dyseidetic dyslexia was characterized by a reading and spelling pattern that reflects difficulties with word-symbol associations and perception of letters and words as whole configurations.

Boder (1971) administered the screening test to ascertain the distribution of the types of dyslexia among school age and adolescent subjects. A group of 107 students, ages 8-16 years, were given the test. These subjects demonstrated normal intelligence, no gross neurological defects, and reading abilities at least two years below grade level. The test results indicated that 63% of the subjects had dysphonetic dyslexia, 9% had dyseidetic dyslexia, and 23% had mixed dysphonetic-dyseidetic dyslexia. Seven percent of the subjects could not be placed in any of the three categories. Boder concluded that the screening test which utilizes reading and spelling patterns, was effective in identifying subcategories of dyslexia.

Clinical neuropsychological evaluations were utilized by Mattis, French and Rapin (1975) to identify patterns of dyslexia in 252 learning disabled subjects. These subjects had originally been referred to pediatric neurologists for assessment. After screening the participants for neurological status, level of intelligence, age and sensory status (vision and hearing), consistency of school attendance and emotional stability, a subpopulation of 113 subjects was identified for the research study. Administration of the Wide Range Achievement Test (Jastak, Bijou and Jastak, 1965), contributed to the designation of an additional three subcategories. These consisted of: 1) brain damaged but with adequate reading ability (N=31); 2) brain damaged with dyslexia (N=53); and, 3) dyslexia with no brain damage (N=29). All subjects received the following battery of tests: 1) Illinois Test of Psycholinguistic Abilities (ITPA) - Sound Blending Subtest (Kirk, McCarthy and Kirk, 1968); 2) Spreen-Benton Token Test (Benton, 1967); 3) Sentence Repetition Subtests (Benton, 1967); 4) WISC; 5) WAIS; 6) Benton Test of Visual Retention (Benton, 1963); 7) Raven Coloured Progressive Matrices (Raven, 1962); 8) Purdue Pegboard (Costa, Scarola and Rapin, 1964); 9) researcher developed test for discrimination of the $\bar{e}$ vowel in rhyming nonsense syllables (i.e. b$\bar{e}$) and, 10) a test of naming of colors and body parts.

Analysis of the results delineated three specific dyslexic subgroups. Group I was labeled language disordered. Group I subjects were nonfluent readers who were unable to name at least 20% of the objects on the naming test. These subjects also exhibited one of the following characteristics: 1) comprehension deficiency (Token Test Score one standard deviation below performance I.Q.); 2) imitative speech deficiency (Scored one standard deviation below the mean on the Sentence Repetition Subtests); 3) speech sound discrimination deficiency (10% or more errors on the sound discrimination task). Group II was labeled articulatory and graphomotor dyscoordination. The following pattern was indicative of this subgroup: 1) score on the ITPA Sound Blending subtest one standard deviation below the test mean; 2) score on Graphomotor subtest of the Visual Retention Test one standard deviation below the mean; 3) auditory discrimination and comprehension within normal limits for age. Group III was labeled visual-spatial disorder. The following pattern was indicative of this subgroup: 1) Verbal I.Q. more than one standard deviation above Performance I.Q.; 2) Performance on Raven's Coloured Progressive Matrices was less than Performance I.Q. Based on these results Mattis, etal. predicted that those with a language disorder will experience severe reading failure. Those with dyslexia as a symptom of articulatory and graphomotor dyscoordination will exhibit buccal-lingual dyspraxia (nonfluent speech). Those with dyslexia as a symptom of visual-spatial problems will exhibit visual processing difficulties. Mattis, etal. concluded that there are three processes critical to normal development of reading: 1) adequate language development; 2) adequate motor speech ability for sound blending; and, 3) adequate visuo-spatial perception.

Steinberg (1976) studied forty-five third and fourth grade boys with severe developmental reading delay. Her purpose was to test the hypothesis that subpopulations of reading disabled can be identified within a population of reading handicapped. Each subject was administered a battery of tests to assess language, visual perception, reading comprehension, and visual agnosia. Cluster analyses were performed using various combinations of test scores. The result was three subtypes of dyslexia:

Type I: Deficiencies in visual-motor abilities
Type II: Deficiencies in language
Type III: Normal visual-motor and language development.

Stepwise regression analyses were also completed using scores from reading comprehension, language, and visual-motor tests. Language was shown to be the best predictor of reading comprehension.

Doehring & Hoshko (1977) utilized the Q-technique of factor analysis to ascertain whether or not specific subgroupings of school age children with specific dyslexia could be delineated statistically. The Q-technique of factor analysis,

> ... can be used to define subgroups of reading disability in terms of factor loadings of the children tested, and also to express the test profile of each subgroup in terms of the factor scores of the tests (p.282).

The research subjects were participants in a summer reading program. Based on scores from evaluations performed during the school year and during the summer reading program, the researchers divided the participants into two groups: Group R (N=34) and Group M (N=31). Group R included those subjects with specific reading disabilities, whereas Group M included those with language disorders, mental retardation, and learning disabilities. The subjects in both groups ranged in ages from 8 years, 8 months to 17 years, 4 months. From the two groups the following subgroups were identified:

Subgroup 1: Deficiency in oral reading of text and nonsense syllables.
Subgroup 2: Deficiency in phoneme-grapheme associations.
Subgroup 3: Deficiency in auditory and visual word and nonsense syllable matching.

Doehring and Hoshko found that Subgroup 1 is similar to the language disorder subgroup reported by Kinsbourne and Warrington (1963) and Mattis, etal., (1975). Subgroup 2 exhibited intersensory integration problems like those described by Benton (1975). Subgroup 3 resembled the visual perception disorder subgroup identified by

Myklebust (1965) and Mattis, etal., (1975).

Vernon (1977) criticized the grouping of disabled readers exclusively by cognitive-linguistic deficiencies. He believed that subtypes of the reading handicapped population should be derived from patterns of reading errors. The psychological functions underlying these patterns can then be studied.

Vernon (1977) devised a classification system for poor readers, in which reader subgroups correspond to points of reading breakdown. This system was developed by reviewing research studies pertinent to handicapped readers. Among those studies reviewed were: de Hirsch, Jansky, and Langford (1966); Liberman, Clay, and Imalch, 1971; Shankweiler and Liberman, 1972; Liberman, Shankweiler, Fischer, and Carter, 1974. A set of four specific reading deficiencies was identified: 1) deficiencies in the capacity to analyze complex sequential visual-linguistic and/or auditory-linguistic structures into component parts; 2) deficiencies in linking visual-linguistic structures to auditory-linguistic structures; 3) deficiencies in establishment of regularities in variable grapheme-phoneme association, and 4) deficiencies in synthesizing printed words into prhases. Vernon concluded that reading disability is not a unitary syndrome and, recommended exploration of the cognitive and linguistic abilities of reading handicapped children exhibiting the four types of reading deficiency patterns. He stated that future researchers must thoroughly describe the reading abilities of their subjects prior to evaluation of the psychological processes underlying the reading problems.

Pirozzolo (1979) analyzed the eye movements of twenty-four fifth grade disabled and able readers. He divided the reading disabled subjects into two groups, those with auditory-linguistic dyslexia and those with visual-spatial dyslexia. The auditory-linguistic dyslexics exhibited difficulties in grapheme-phoneme associations, word retrieval in picture naming tasks, production of grammatical sentences in oral reading and conversation, and speech sound discrimination. These subjects also had a history of delayed language development. Results from administration of the WISC-R revealed the visual-spatial dyslexics to have superior verbal intelligence. The able readers were reading at or above grade level and had normal intelligence. Eye movements were recorded for each subject during a silent reading task. Pirozzolo found that the eye movement patterns of the auditory-linguistic dyslexics and able readers were the same. However, as text complexity was increased above reading grade levels, the able readers and auditory-linguistic dyslexics exhibited an increase in eye fixation time and number of eye movement regressions. The visual-spatial dyslexics demonstrated right-to-left reading and difficulty locating the first words of subsequent lines of text. Pirozzolo concluded that children with visual-spatial dyslexia perform poorly on visual information processing tasks because of a maturational lag in the central nervous system.

In order to provide an indepth description of auditory-linguistic and visual-spatial dyslexia Pirozzolo (1979) conducted two separate single case studies. Both subjects were adults in their early twenties. One of the subjects was suspected of having auditory-linguistic dyslexia and the other visual-spatial dyslexia. Each individual underwent an evaluation that consisted of neuropsychological testing, a neurological examination, and auditory and visual acuity screenings. The subject with probable auditory-linguistic dyslexia responded poorly to all verbal tasks presented during neuropsychological testing. The subject with probable visual-spatial dyslexia responded poorly to all visual-spatial tasks presented during neuropsychological testing. Neurological examinations revealed normal neurological functioning for both subjects. Hearing and visual screenings indicated acuity to be within normal limits. Pirozzolo concluded that at least two separate dyslexic syndromes can be identified, auditory-linguistic dyslexia and visual-spatial dyslexia.

Lyon and Watson (1981) studied a group of 100 reading disabled and fifty reading able twelve year old children. The purposes of the study were identification of dyslexic subgroups, and a comparison of the reading abilities of the disabled and able readers. All subjects had normal intelligence and normal visual and auditory acuity. A battery of tests was administered to the reading handicapped group to assess linguistic and perceptual-motor functioning. A cluster analysis of the test results yielded six subgroups. However, three subtypes of dyslexia: 1) auditory-linguistic; 2) visual-spatial; and, 3) mixed, can be used to describe the six subgroups identified by the authors. A significant difference between the reading disabled subjects and the normal reading subjects was found when compared on reading abilities. Lyon and Watson recommended that further research be undertaken to describe the reading patterns exhibited by the different dyslexic subgroups.

Fried, Tanguay, Boder, Doubleday and Greensite (1981) compared the auditory event-related potentials of the thirteen dyslexics and thirteen normal readers. The subjects ranged in age from eight to twelve years. The dyslexics were assigned to subgroups (dysphonetic, dyseidetic, dysphonetic-dyseidetic) based on the results obtained from administration of Boder's (1971) dyslexia screening test. The auditory event related potentials were obtained using surface disk electrodes placed on each subject's scalp over the left and right frontal lobes and over the temporoparietal areas of the brain. Nonverbal stimuli that consisted of musical chords and verbal stimuli that consisted of "do" and "go" were presented binaurally through headphones. The results revealed no differences between event related potentials on either side of the brain in the dysphonetic dyslexics. The dyseidetic dyslexics and dysphonetic-dyseidectic dyslexics exhibited event related potentials that were the same as the controls. The authors concluded that dysphonetic dyslexia is the result of a delay in hemispheric specialization. However, they felt their data could not explain the neurological basis of dyseidetic and dysphonetic-dyseidetic dyslexia.

Four different methods have been utilized to identify subgroups of children with dyslexia: 1) administration of test batteries to assess cognitive and linguistic abilities; 2) evaluation of reading and spelling patterns; 3) analysis of eye movement patterns; and, 4) auditory event related potentials within and between cerebral hemispheres. Although the number of dyslexic subgroups delineated by these four methods ranges from two to six, two types have been consistently documented. The syndromes of auditory-linguistic dyslexia and visual-spatial dyslexia described by Pirozzolo (1979) encompass the majority of subtypes of dyslexia described by other authors (Kinsbourne & Warrington, 1963; Boder, 1971; Mattis etal., 1975; Steinberg, 1976; Doehring & Hoshko, 1977; Lyon & Watson, 1981; Fried etal., 1981). Besides the two categories of dyslexia discussed by Pirozzolo (1979), Myklebust (1965) and Boder (1971) have identified children with dyslexia who fit a mixed dyslexic syndrome.

The Relationship of Verbal Language Disorder to Reading Disability

In order to ascertain the psychological correlates of reading disability, Kass (1962) studied a total of twenty children in grades two, three, and four. Subjects in grade two were six months below grade level in reading; those in grade three were eighteen months below grade level in reading; and those in grade four were thirty months below grade level in reading. All participants had normal intelligence, visual acuity, and hearing acuity. To delineate the linguistic and cognitive abilities of the subjects the following tests were administered: 1) ITPA (Experimental version); 2) Visual Automatic Test (VAT) (Kass, 1962); 3) The Sound Blending Test (Monroe, 1932); 4) Mazes subtest from the WISC; 5) The Memory-For-Designs Test (Graham & Kendall, 1960) and, 6) The Perceptual Speed Test (Subtest from the Primary Mental Abilities Test for ages 7 through 11 years, Thurstone & Thurstone, 1954).

Kass compared the results of her study group on the above test battery to those of the norming populations from each of the tests. Her subjects were found to be similar to the norming samples on the Auditory Decoding, Visual-Motor Association, Motor Encoding, and Auditory-Vocal Sequencing Subtests from the ITPA. Her subjects scored below the norming populations on the Auditory-Vocal Association, Auditory-Vocal Automatic, Visual-Motor Sequencing subtests from the ITPA, the Mazes, Memory-For-Designs, and Perceptual Speed tests. Kass concluded that children with reading disabilities in grades two, three, and four will exhibit a specific test profile on measures of language and lower order cognition, i.e., visual discrimination, closure and speed of visual recognition.

Hyatt (1968) studied the verbal language and visual-perceptual abilities of sixty-four school age children. These second grade children were at least three months behind their same aged peers in reading performance. Hyatt's research purpose was to ascertain whether reading disabilities present at the end of second grade were due to "psycholinguistic deficits" (p.25). All of the children had a measured intelligence quotient of 85 or above. The control group consisted of ten second grade students who scored the highest in reading on the Stanford Achievement Test (SAT) (Kelly, Madden, Gardner and Rudman, 1964). The group was chosen to control for what Hyatt termed,

> ... the possibility that any difference found in the poor readers was a characteristic of this particular area and might be found to exist in all students of the Bend (Oregon) schools (p.28).

At the close of the school year, all subjects were administered the following test battery: 1) ITPA (Experimental form); 2) VAT; 3) Mazes; 4) SAT; and 5) Durrell Analysis of Reading Difficulty (Durrell, 1955). The good readers in Hyatt's (1968) study differed significantly from the poor readers on the Mazes subtest of the WISC, the Auditory Decoding, Auditory-Vocal Association, Vocal Encoding, Auditory-Vocal Sequential, and Visual-Motor Sequential subtests of the ITPA, and total ITPA score. Hyatt also compared her poor readers to those in an earlier study by Kass (1962). The poor readers in Hyatt's study differed only on the Auditory-Vocal sequencing subtest from the ITPA. Although intersubject discrepancies on the ITPA subtests were found, all poor readers in both studies (Hyatt, 1968; Kass, 1962) scored at least two standard deviations below the test mean on the Visual-Motor Sequential subtest of the ITPA. Hyatt concluded that by the end of the second grade, children reading at least three months behind their peers will exhibit psycholinguistic deficiencies. These deficiencies are due to a delay in language development.

Vent (1971) studied the speech and language characteristics of thirty subjects with dyslexia who ranged in age from seven to fifteen years. The participants had been diagnosed as having dyslexia by pediatric neurologists at the Mayo Clinic. Each individual had normal intelligence, vision, and hearing. The author administered the ITPA and the Peabody Picture Vocabulary Test (PPVT) (Dunn, 1965). Vent included a panel of judges to rate spontaneous language samples in the areas of intelligibility, fluency, and overall complexity of sentences. A case history was also obtained. The author found that fifty percent of the group had a history of receiving therapy for a speech and language disorder and thirty percent had a history of delayed speech development. Ninety percent of the subjects demonstrated measurable linguistic deficits. These results led Vent to hypothesize that developmental dyslexia was a symptom of a generalized language disability. She recommended further exploration of the speech and language deviations of children with severe reading disabilities.

A comparison of the syntactic abilities of twenty normal and twenty severly disabled readers was conducted by Vogel in 1975. The subjects were white males who ranged in ages, from 7 years, 4 months to 8 years, 5 months. The normal readers and dyslexics were matched in accordance to their chronological ages. All of the children with dyslexia had normal intelligence, vision, hearing, and emotional adjustment. Each individual in the study was administered standardized norm-referenced tests and experimental tests to assess syntax, receptive vocabulary, auditory memory, and reading ability. Analyses of the test data revealed the following results: 1) dyslexics differed significantly from the normal readers on all nine measures of syntax; 2) auditory memory (digits and words) had a significant effect on the nine measures of syntax; and 3) the three syntactic measures that discriminated between the dyslexics and the normal readers were the Grammatic Closure test (ITPA), Exploratory Test of Grammar (Berry & Talbott, 1966), and the Test of Recognition of Melody Pattern (Experimental). Based on these results, Vogel recommended the inclusion of the Exploratory Test of Grammar and the Grammatic Closure test (ITPA) as part of any assessment battery for children with reading problems.

Vellutino, Steger, Harding and Phillips (1975) compared 120 subjects who were divided into equal groups of fourth, fifth and sixth grade normal and disabled readers on visual-auditory-nonverbal and visual-verbal paired-associate learning tasks. All subjects had measured intelligence on the WISC-R of ninety or above. Subjects also exhibited normal physical and neurological development, normal vision and hearing, normal emotional adjustment, and a high level of school attendance. Disabled readers were at least two years below grade level on a standardized diagnostic reading test. Normals performed at or above grade level on the same instrument. The visual-auditory-nonverbal task required association of nonmeaningful designs with nonmeaningful verbal stimuli. The visual-verbal tasks required association of meaningful pictures with nonsense syllables and association of single syllable nonsense words with three letter-like figures. The results indicated no significant interactions between grade levels and reader groups in either of the conditions. No differences were found between normal and handicapped readers on the auditory-visual-nonverbal task. However, significant differences were obtained between the two groups on the visual-verbal tasks. Vellutino etal, concluded that dyslexia may be due to a language disorder.

Word retrieval performance for picture-naming was studied by Denckla and Rudel (1976). These authors compared the naming abilities of three subject groups: 1) ten non-dyslexics diagnosed by a neurologist as having minimal brain dysfunction (MBD) Syndrome; 2) ten dyslexics diagnosed as MBD; and 3) ninety normal readers. The non-dyslexic and dyslexic subgroups were differentiated by their responses to the Gray Oral Reading Test (Gray, 1962) and the reading subtests from the Peabody Individual Achievement Test (Dunn & Markwardt, 1970). All subjects had normal intelligence as measured on the WISC-R. Each participant was shown thirty-six black-on-white line drawings after the naming procedure developed by Newcombe, Oldfield, Ratcliff and Wingfield (1971). The procedure was devised for the purpose of identifying brain damaged adults with minimal aphasia. The subjects named or described each of the pictures which were presented singularly. Latency times were recorded for naming, along with type of naming error and picture descriptions. Group comparisons were made for total number of correct names produced, distribution of error types, and speed of naming. The comparisons revealed the following results: 1) words that had an occurrence of one to nine per million clearly differentiated the dyslexic from the non-dyslexic MBD and the controls; 2) dyslexics and controls made the highest percentage of circumlocutions and response-refusals; 3) nondyslexics made the highest percentage of wrong name errors; and 4) dyslexics had the longest latencies on words that had an occurrence of five in one million. Denckla and Rudel concluded that the high number of naming errors made by the non-dyslexic MBD subjects was the result of impaired visual perception. The delay in naming pictured objects for the dyslexic group was indicative of impairment in linguistic word retrieval.

The receptive and expressive language abilities of thirty-eight normal and disabled readers were compared by Newcomer and Magee (1977). The subjects ranged in age from 6 years, 7 months to 8 years, 11 months. All participants were administered the Test of Language Development (Hammill & Newcomer, 1977). As a group, the disabled readers did not differ significantly from the normal readers in overall language scores. However, a large proportion of the handicapped readers had expressive language deficiencies.

In a discussion of the etiology of developmental dyslexia, Myklebust (1978) stated that, "Dyslexia is a disorder in symbol-making behavior; other reading disabilities are not" (p.11). He further indicated that dyslexia can be differentiated from other types of reading problems through using language assessment instruments. On this point Myklebust declared that, "...nonlanguage reading disabilities can affect language acquisition and reduce the reading level; they are not deficiencies in ability to symbolize" (p.10).

A 1981 proposal drafted by the Ad Hoc Committee on Learning Disabilities of the American Speech-Language-Hearing Association (ASHA) revealed speech-language-hearing as processes basic to learning and communication. This paper often referred to the view that reading is a linguistic process. Developmental reading disabilities may result from a breakdown in any one or all of these communicative processes. The ASHA report described the school curriculum as catering to the normal child who has developed competent language skills for learning to read and write. The Ad Hoc Committee stated that the Speech-Language

Pathologists' role in intervention with the reading handicapped individual is assurance of adequate speech-language development to support acquisition of reading and writing skills. Recommendations were made by the Committee to guide further research in language-based learning disabilities. The first included delineation of particular aspects of language that are central to the reading process. The second recommendation proposed was to research the utilization of standardized language and reading tests in the evaluation of language-learning disabilities (ASHA, 1981).

Idol-Maestas (1981) compared the oral language abilities of forty-four reading-disabled children with fifty-nine reading-able children. The subjects were randomly selected from a population of handicapped and normal readers in grades two, four, and six. Both the disabled readers and the able readers were stratified on ethnic background and sex. The disabled readers presented a reading level of at least two years below grade level. The normal readers were reported to be reading at or near grade level. A series of questions were asked of each subject. The purpose of this questioning was to elicit fifty utterances for purposes of sentence analyses employing the Developmental Sentence Scoring (DSS) procedure (Lee & Canter, 1971). The Raven Progressive Matrices was also administered to each participant in the study. In addition to obtaining the DSS scores, Idol-Maestas computed mean length of utterance (MLU) and Type Token Ratios (TTR). The number of prompts necessary to obtain the fifty utterances and the number of different parts of speech used by each subject were also computed. The results of covariance analyses revealed the non-significant effects of socioeconomic status and nonverbal intelligence on the oral language scores. Results revealed that ethnic group membership and sex did significantly affect the oral language scores. The performance of the reading disabled group was characterized by significantly lower DSS and MLU scores when compared to the normal readers. A multivariate analysis revealed that DSS, MLU, TTR and number of verbal prompts all contributed to the distinction between the disabled and the able readers. Overall use of parts of speech had a minimal influence on the differentiation between the two research groups. Idol-Maestas further added that differentiation was adequately made using all cited measures except the parts of speech tally.

Ellis (1981) conducted five separate experiments to ascertain whether name coding was a problem for children with dyslexia. In the first two studies twenty-one reading disabled males and twenty-one normal reading males were compared. The mean age of these subjects was 11 years, 8 months. All subjects had normal intelligence and were free of behavioral and organic disorders. The reading level for each child was determined as at least two years below chronological age. In the first experiment the students were asked to compare letters on their visual characteristics. The results of comparison revealed no differences between the two subject groups when the letters were in fact different. However, dyslexics differed significantly from normal readers when asked to discriminate between upper and lower case letters and visually similar letters. The second experiment was a timed form discrimination task. The results revealed dyslexics to be significantly poorer in nonsense form discrimination, but able to respond as quickly as the normal readers to the task stimuli. Ellis tentatively concluded that the results of experiments one and two point to a name coding deficiency in the dyslexic subjects. However, the first two studies did not rule out the possibility of a visual coding problem in dyslexia. In order to rule out a visual processing deficiency the author carried out three more experiments. In experiments three and four sixty-one male dyslexics with a mean age of 12 years, 3 months were compared to a group of normal readers with a mean age of 11 years, 9 months and a group of undergraduate students with a mean age of 19 years. The older subjects were included to investigate the influence of age and superior reading ability on memory. All subjects were presented various memory tasks with nonsense forms. The results of both studies revealed no differences between the dyslexics and the normal readers irregardless of age and reading level. In the fifth experiment thirteen male dyslexics and thirteen normal readers with a mean age of 11 years, 8 months were compared on a verbal repetition task. All participants were timed during repetition of words that varied in phonological complexity. The results showed that dyslexics could repeat words as quickly and accurately as normal readers. Ellis concluded that the encoding of a graphemic stimulus requires naming, i.e., letter-sound associations. The presumed deficiency underlying dyslexia is in lexical name encoding.

Hulme (1981) conducted three studies in which he examined the effect of manual tracing on memory for alphabet letters and nonlinguistic forms between twenty normal readers and twenty disabled readers. The mean age of the normal readers was 10 years, 3 months and the mean age of the disabled readers was 10 years, 2 months. All subjects had intelligence quotients of 90 or above. In the first experiment the subjects were asked to remember a set of six and later eight alphabet letters. Letters were presented in the following four conditions: 1) two dimensional letters presented visually; 2) two dimensional letters presented visually and traced by each child; 3) three dimensional letters presented visually; and 4) three dimensional letters presented visually and traced by each child. The results showed that the retarded readers remembered fewer letters than the normal readers. He also found that tracing had a differential effect on memory for letters in favor of the dyslexic subjects. However, presentation of two dimensional or three dimensional letters had no significant effect on memory for letters. The second experiment was identical to the first except that nonlinguistic forms were substituted for letters and only two dimensional forms were presented. The results revealed that tracing improved memory for nonlinguistic forms in both subject groups. There was no difference between the two subject groups on number of nonlinguistic forms recalled. In order to rule out the effect of experience the reading disabled subjects from the first studies were matched with younger normal readers at the same reading age in the third study. The procedure followed in this study was the same as in experiment one, except that the alphabet letters presented were two dimensional. The results showed that tracing improved the recall of target letters in both groups, with tracing significantly increasing the number of letters recalled by the dyslexic group. Hulme concluded from the three studies that dyslexia is the result of an underlying verbal learning deficit rather than poor visual perception or poor visual memory. The author also hypothesized that children with dyslexia have a phonological recoding problem. This deficiency forces them to rely on visual memory in remembering letters. The addition of tracing acted as a mnemonic supplement.

Donahue, Pearl, and Brian (1982) studied the syntactic proficiency of a group of sixteen reading disabled and sixteen normal reading children in the second, fourth, sixth, and eighth grades (eight per grade). The disabled readers had normal intelligence but scored below the 40th percentile on the Woodcock-Johnson Psychoeducational Battery (Woodcock and Johnson, 1977). Subjects were matched on grade level, sex, and school attended. The mean age of the two groups was 10 years, 3 months. Each subject was required to describe pictures of abstract shapes so that an examiner sitting next to the child could locate the identical picture from an array of the same type of pictures. The t-unit (a main clause with subordinate clauses attached) was the unit used for syntactic analysis. The results revealed reading disabled children produced significantly fewer words per main clause. No differences were found for the length of the children's descriptions. The authors concluded that the language production of the reading disabled children in this study was significantly impaired. This impairment in productive verbal expression may interfere with successful communication among linguistically normal peers and adults.

Moore, Kagan, Sahl, and Grant (1982) compared the perceptual, motor, memory, and linguistic functioning of two different groups of school age disabled and normal readers. The study was conducted in two phases over a period of sixteen months. The subject groups in the first phase were composed of thirty-five male disabled readers with a mean age of 10 years, 4 months and thirty-five male normal readers with a mean age of 10 years, 3 months. All of the participants were white, middle class, and English speaking. Initial testing showed all subjects to have normal or above intelligence, normal vision, and normal hearing. The children with dyslexia were identified by their school as reading at least two years below grade level. The Phase II subject groups were composed of twenty-nine of the original dyslexic group and twenty-nine of the original control group. The results of memory testing showed the reading disabled subjects did significantly poorer than the controls on all recall and recognition tasks. Decision time data revealed the reading disabled subjects to be significatnly slower than the control subjects in evaluation of orally presented sentences and retrieval of category names. There was no difference between the two groups on the amount of time to react to the linguistic stimuli presented. As a group, the reading handicapped students had little difficulty recognizing printed words read or discriminating between pairs of words presented auditorily. The Phase II findings germane to this study are related to the linguistic functioning of the dyslexic subjects. Reading disabled children were found to be significantly slower than the normals in evaluating sentences and naming pictures. A subgroup of seven of the twenty-nine reading impaired subjects was found to account for the significant difference between the two subject groups. This subgroup exhibited deficiencies in verbal language. From these results the authors concluded that dyslexia is not a unitary syndrome. In fact, the dyslexic subjects had only poor reading and poor recall of digits in common. Also, the high level of performance by the reading disabled subjects on the auditory and visual perception tasks indicates that dyslexia is not the result of auditory or visual perceptual deficits. These findings led Moore etal to hypothesize that some reading disabled children have poorly developed schemata which interferes with assimilation of incoming linguistic stimuli.

All of the studies reviewed in this section have demonstrated that comparison of verbal language performance for handicapped and normal readers yields statistically significant differences. This conclusion supports Myklebust's (1978) hypothesis that dyslexia can be differentiated from other reading problems on the basis of language assessment. The Ad Hoc Committee on Learning Disabilities of the American Speech-Language-Hearing

Association (1981) has stated that any breakdown in the basic communicative processes (speech-language-hearing) will have deleterious effects on learning to read and write. A verbal language disorder is a suspect symptom of a reading disability (Vellutino, 1979).

Statement of the Problem

The results of the literature review relevant to reading disabilities reveals an absence of studies in which both the reading comprehension and verbal language of reading disabled children are investigated. The purpose of this study was to describe the reading comprehension and verbal language of a group of reading disabled children in the fourth and fifth grades. This study explored the following research questions:

1) Is there a difference in the verbal language abilities of children who have reading problems and children with normal verbal language development on a standardized norm-referenced test of verbal language?
2) What are the verbal language characteristics of children with reading problems?
3) What are the reading comprehension characteristics of children with reading problems?
4) Is there a relationship between verbal language and reading comprehension in a group of children

with reading problems?

CHAPTER III

PROCEDURES

This study utilized standardized testing procedures to describe the reading comprehension and verbal language characteristics of a group of fourth and fifth grade disabled readers. A four step testing process was used to identify the study group and to obtain the reading comprehension and verbal language data. The data were collected from June, 1982 through January, 1983. The following discussion includes a description of the subjects, testing instrumentation, testing procedures, and data analysis.

Subjects

The subjects who participated in this study were fourth and fifth grade children attending public schools in Lane County, Oregon. These children had been identified by officials at their respective schools as reading disabled. Subjects had to meet the following criteria for entrance into the study: normal vision, normal hearing, normal intelligence, normal visual perception, and score below average on at least one subtest of a standardized test of reading comprehension. Initially thirty-one children volunteered for the study. At the conclusion of the screening testing, twelve children met the criteria for participation in the study. The twelve subjects are described by grade level below:

Grade	Age Range	Number
4	9 years, 4 months to 9 years, 11 months	5
5	10 years, 4 months to 11 years, 11 months	7

Instrumentation

Reading Tests

The Test of Reading Comprehension (Brown, Hammill, and Wiederholdt, 1978) (TORC) was used to identify those subjects who were disabled readers. It also provided information on the reading comprehension of the disabled readers. The following five subtests from the TORC were utilized in this study: General Vocabulary, Syntactic Similarities, Paragraph Reading, Reading the Directions of School Work, and Sentence Sequences. The TORC was standardized on 2,707 students in grades two through twelve from ten states. According to Brown etal (1978) the TORC "...reflects current psycholinguistic theories involving both language and cognition" (p.6). A Reading Comprehension Quotient (RCQ) is derived after combining scaled scores from the General Vocabulary, Syntactic Similarities, and Paragraph Reading subtests. Test-retest reliability with the RCQ was .91 with the different subtest coefficients ranging from .64 to .86. Internal consistency was found to be adequate for children in the grade levels measured by the TORC. Test content was derived from the test researchers' notion that reading comprehension is an active cognitive-linguistic process in which the reader interacts with the author and establishes relationships between concepts. The criterion related validity of the TORC was found to be positively correlated with four often used tests of reading achievement. Construct validity of the TORC was found to be good. Subjects' scores were found to increase with age, indicating the TORC is developmental. The subtests were found to be all interrelated. The TORC differentiated between normal and disabled readers. The TORC was also found to be positively correlated with measures of intelligence, math, and language arts. All subtests were administered and scored following the guidelines in the TORC examiner's manual.

The Slosson Oral Reading Test (Slosson, 1963) (SORT) was chosen to identify subjects with a reading disability. The SORT was designed to assess the oral reading of isolated words by children from first grade through high school. Administration time averaged from five to ten minutes. The SORT was standardized on a population of 108 children from first grade through high school. The vocabulary was derived from school readers at each of the twelve grade levels. Test retest reliability was .99. Criterion related validity was measured at .96 with the Standardized Oral Reading Paragraphs by Gray (1915). In order to be categorized as having a reading disability, subjects were required to score at least two years below grade level on the SORT (Vellutino, Steger, Harding, and Williams, 1975).

Although this author felt the SORT would be a quick and reliable instrument for identifying disabled readers, it proved to be nondiscriminatory. The SORT was administered to the first sixteen children assessed for the study with only two scoring two years below grade level. However, the TORC revealed twelve of these same subjects to have a reading problem. The SORT was eliminated from the test battery in favor of the TORC. The SORT's validity has been questioned by reading experts (Hasenstab & Laughton, 1982).

Intelligence Screening

Intelligence was assessed with the Slosson Intelligence Test (SIT) (Slosson, 1963). The SIT was standardized on subjects who ranged from 4 years through adulthood and who resided in urban and rural areas of New York. The purpose of the test is to screen individual intelligence. Concurrent validity was established with the Stanford

Binet Form L-M (1960) and ranged from .90 at age 4 years to .97 for adults (16 years and above). Test-retest reliability over a period of two months was found to be .97. This test was chosen because of the high test-retest reliability. Administration took approximately 30 minutes. The SIT was administered and scored using the standard procedures outlined in the test manual.

Visual Perceptual Test

Three subtests from the Performance scale of the Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler, 1974) were utilized to test visual perceptual functioning. The subtests, Block Design, Picture Completion, and Object Assembly, were used to identify subjects with adequate visual perceptual abilities (Pirozzolo, 1979). Kaufman (1975) performed a factor analysis of the WISC-R and identified the three previously mentioned subtests as composing a visual perceptual factor. He has stated that the scaled scores of the three tests can be averaged to derive a visual perceptual score. The WISC-R was standardized on a sample of children who ranged in age from 6 years to 16 years, 11 months. The norming sample was stratified on the following variables: age, sex, race, geographic region, occupation of head of household and urban and rural residence. This sample approximated the population of the United States in 1970. Split-half reliability coefficients for ten of the twelve subtests yielded an average for all ages tested which ranged from .70 to .86. Average full scale I.Q. was .96 with Verbal I.Q. and Performance I.Q. at .94 and .90 respectively. Stability coefficients for the three subtests were established with 303 children in three age groups, 6½ - 7½ years, 10½ - 11½ years, and 14½ - 15½ years. The stability coefficients for the 10½ - 11½ year olds are reported as this group approximates the age range of subjects in this study. Corrected correlations were: Block Design .86, Picture Completion .82, and Object Assembly .73. The three subtests were administered and scored using the standard procedures outlined in the test manual.

Verbal Language Test

Verbal language was assessed with the Test of Language Development (TOLD-I) (Hammill & Newcomer, 1982). This test is composed of the following five subtests: Sentence Combining, Characteristics, Word Ordering, Generals, and Grammatic Comprehension. These subtests measure different aspects of verbal language comprehension and expression. The TOLD-I was standardized on 871 children who ranged in age from 8 years, 6 months to 12 years, 11 months. Subjects were tested in thirteen states; a sample which approximates the 1980 population of the United States.

Test-retest reliability ranged from .83 to .96 for the standard scores. According to Hammill and Newcomer (1982) this "...warrants the use of the (sub) tests with individual children" (p.3). Internal consistency of the TOLD-I was found to be high at four age levels (9-12 years). Scores were found to increase with age, indicating the test is developmental. All five subtests were found to be interrelated and correlated positively with the written language subtests of the Test of Adolescent Language (TOAL) (Hammill, Brown, Larsen, & Wiederholdt, 1980). The TOLD-I was also found to differentiate between linguistically normal and linguistically disabled children. Content validity was established by "experts" (p.3) in the study of language. Criterion validity with the spoken language subtests of the TOAL was found to be high. Construct validity was determined with the written language subtests of the TOAL. All subtests were administered and scored following the guidelines in the TOLD-I examiner's manual.

Testing Procedures

The Setting

All subjects were tested either in a clinic room within the University of Oregon Speech-Language-Hearing Center or in a room at one of two Eugene area elementary schools. All rooms were quiet, well-lit, contained a small table to support test materials, and chairs for examiner and subjects.

Step I: Identification of Major Subject Pool

The objective of Step I was identification of a major subject pool composed of fourth and fifth grade children with reading problems. Three methods were used to identify potential subjects. First, advertisements were placed in the Eugene Register-Guard newspaper (Circulation throughout Lane County, Oregon) and in the Springfield News (circulation throughout Springfield, Oregon and smaller outlying communities) (Appendix A). Second, an informational letter was mailed by the Eugene Public Schools Research Department to the parents of sixty fourth and fifth grade children enrolled in resource programs in the Eugene Public Schools (Appendix B). Third, an informational letter and consent form was mailed by officials at Silver Lea and Meadowlark Schools (of the Eugene Public School System) to the parents of fourth and fifth grade children receiving remedial reading services (Appendix C and Appendix D). Figure 2 on page 63 graphically describes Step I in relation to the other testing steps in the study.

Step II: Identification of Reading Disabled Subgroup

The objective of Step II was selection of subjects from the major subject pool with normal vision, normal hearing, normal intelligence, but with a reading disability. Standardized testing procedures were used to identify children for this subgroup. Testing took place at the following three locations in the Eugene area: University of Oregon Speech-Language-Hearing Center (U of O), Silver Lea School, and Meadowlark School. Separate parent information letters and consent forms were developed to meet the requirements of each testing site (Appendix E, U of O; Appendix C, Silver Lea; and Appendix D, Meadowlark). These informational letters advised the parent(s) of the purposes of the study, the types of tests to be used, and the feedback process. A signed parental consent form was obtained for each child prior to testing. Figure 2 on page 63 graphically describes Step II in relation to the other three testing steps in the study.

The visual assessment entailed completion of the Vision Screening Questionnaire by the child's parent or classroom teacher (Appendix F). This questionnaire consists of thirteen yes-no questions adapted from vision screening checklists developed by the Oregon State School for the Blind and the Optometric Extension Foundation (1968). Vision was deemed normal if the child's parent or classroom teacher responded no to all thirteen questions on the Vision Screening Questionnaire. When a respondent answered yes to any of the questions he/she was questioned further to insure that the child did in fact consistently exhibit the symptoms described in the particular question. Of the thirty-one subjects, none failed the vision screening.

Assessment of hearing entailed administration of a pure tone air conducted binaural hearing screening test. Testing took place at the U of O Speech-Language-Hearing Center in a sound treated room or in a quiet room at one of the schools. A Beltone portable audiometer was used to present the pure tones at the frequencies 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz at an intensity level of 20dBHL. Each subject was instructed to raise his/her hand when the sound was heard, and lower it when the sound disappeared (Newby, 1964). Auditory acuity was deemed normal if a subject responded twice to the presentation of pure tone signals at the frequencies and the intensity level cited above. Of the thirty-one subjects tested, one failed the hearing screening. This individual's hearing was tested a second time, and after the second failure was referred to the Audiology Clinic at the U of O Speech-Language-Hearing Center for indepth evaluation. This child was eliminated from the study.

Assessment of reading entailed administration of five of the eight subtests from the TORC. Subjects who scored at least one standard deviation below the test mean on at least one of the TORC subtests was deemed to have a reading disability (Brown, Hammill & Wiederholdt, 1978). Of the thirty subjects who were administered the five TORC subtests, seventeen fell at least one standard deviation below the test mean on at least one of the reading comprehension subtests. The thirteen subjects who did not score at least one standard deviation below the test mean on the TORC were eliminated from the study.

Identification of subjects in the reading disabled subgroup with normal intelligence was next in the testing sequence. The SIT was administered to the seventeen subjects who remained eligible for participation in the study. Subjects were required to obtain an intelligence level of at least 80 (Doehring and Hoshko, 1977). Four children did not obtain intelligence quotients of at least 80 and were eliminated from the study. Figure 2 on page 63 graphically describes Step II in relation to the other testing steps in the study.

Step III: Establishment of a Perceptually Adequate Reading Disabled Subgroup

The objective of Step III was identification of subjects within the reading disabled subgroup with adequate visual perception. The thirteen individuals who met the criteria outlined in Step II were tested with three subtests from the Performance Scale of the WISC-R. The subtests used were: Picture Completion, Block Design, and Object Assembly. These three subtests were found to measure the visual-perceptual aspects of intelligence (Kaufman, 1979). Bannatyne (1974) categorized the three subtests together as a measure of visual-spatial functioning. Kaufman (1979) stated that the scaled scores from each of the three subtests could be averaged to provide a numerical index of visual perception. All subjects were required to obtain a minimum mean scaled score on the three subtests of seven. An average scaled score of seven was chosen as a cut-off point as it is one standard deviation below the mean scaled score of ten used for all WISC-R subtests. Only one subject in the group of thirteen failed to achieve a mean scaled score of at least seven on the three WISC-R subtests. This child was eliminated from the study. Figure 2 on page 63 graphically describes Step III in relation to the other testing steps in the study.

Step IV: Administration of Verbal Language Test

The objective of Step IV was to assess the verbal language of the twelve children who met the criteria outlined in Step III. During this final step each of the twelve children was administered the TOLD-I. Figure 2 on page 63 graphically describes Step IV in relation to the other testing steps in the study.

Feedback Procedures

Written and verbal feedback were provided to the parents and/or teachers of the thirty-one children who participated in the study. When a subject failed to meet the criteria in Steps I - III the parent and/or teacher was notified and provided a reason for the failure. At the time of notification the parent and/or teacher was given the option of continuing the testing as a service for the child's participation in the study. Once testing was concluded, the parent and/or teacher received a copy of the child's test scores on the Subject Composite Score Sheet (Appendix G). The author, either in person or by telephone, interpreted the test results for the parent and/or teacher and discussed the educational implications of these results. Figure 2 on page 63 graphically describes parent/teacher feedback in relation to the other aspects of the study.

The author administered and scored the reading comprehension tests, the verbal language tests, and the three subtests from the WISC-R. The author was assisted in administration and scoring of the Vision Screening Questionnaire, the hearing screening, and the SIT by two graduate level students in Speech Pathology. Both students were trained by the author during a one hour inservice (Appendix H).

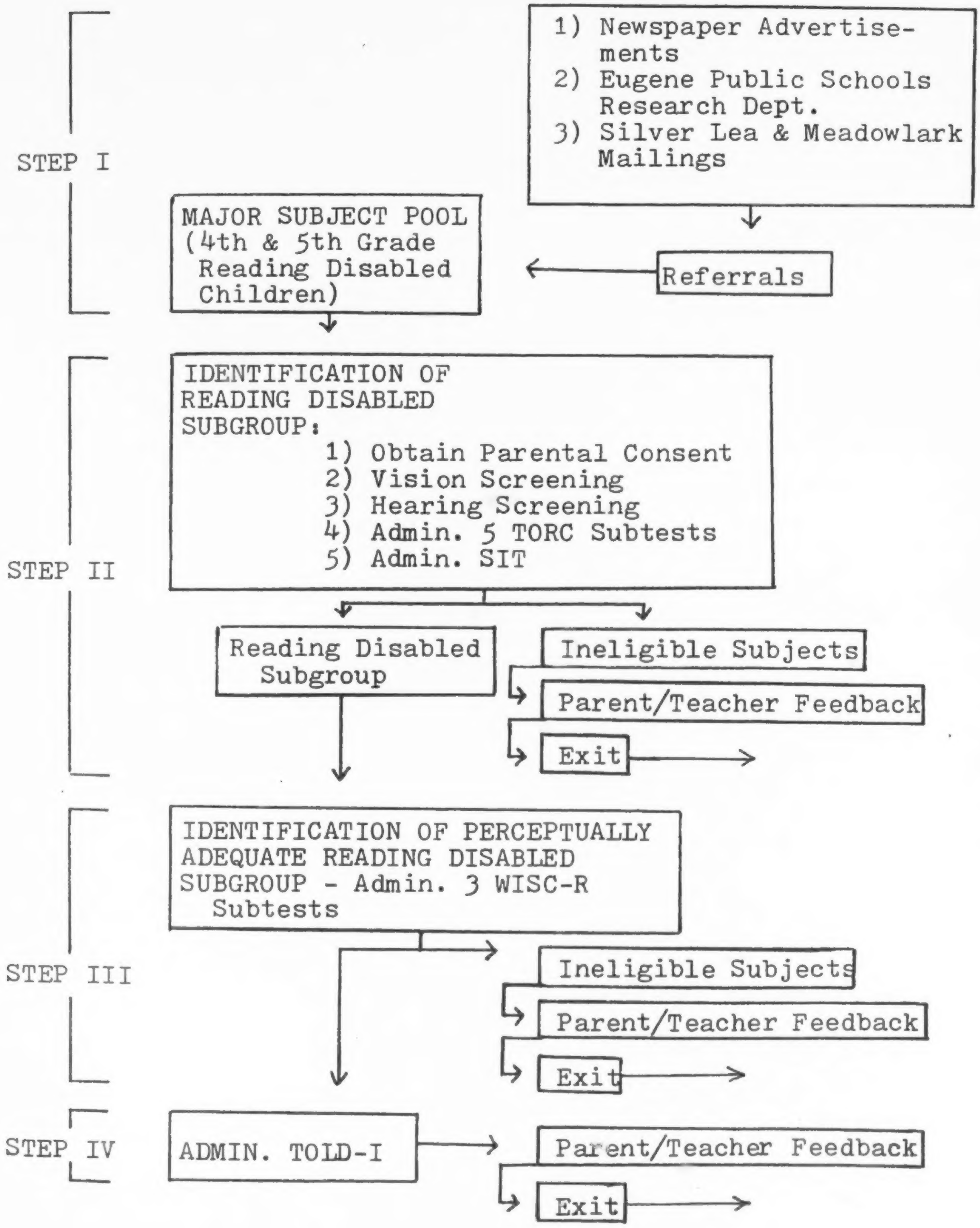

STEP I
1) Newspaper Advertisements
2) Eugene Public Schools Research Dept.
3) Silver Lea & Meadowlark Mailings
MAJOR SUBJECT POOL (4th & 5th Grade Reading Disabled Children)
Referrals
STEP II
IDENTIFICATION OF READING DISABLED SUBGROUP:
1) Obtain Parental Consent
2) Vision Screening
3) Hearing Screening
4) Admin. 5 TORC Subtests
5) Admin. SIT
Reading Disabled Subgroup
Ineligible Subjects
Parent/Teacher Feedback
Exit
STEP III
IDENTIFICATION OF PERCEPTUALLY ADEQUATE READING DISABLED SUBGROUP - Admin. 3 WISC-R Subtests
Ineligible Subjects
Parent/Teacher Feedback
Exit
STEP IV
ADMIN. TOLD-I
Parent/Teacher Feedback
Exit

Figure 2. Testing Process Flow Chart

Data Analysis

Group means, medians, and standard deviations for the twelve subjects in the study were computed using the Spoken Language, Listening, Speaking, Semantic, and Syntax Quotients from the TOLD-I, and the Reading Comprehension Quotients from the TORC. Bar graphs were also used to describe the data graphically. Pearson Product Moment correlation coefficients were computed using the Statistical Package for the Social Sciences (SPSS) (Nie, Hull, Jenkins, Steinbrenner & Bent, 1975) on the Dec 1091 computer at the University of Oregon. These coefficients identified the relationships between the five language quotients from the TOLD-I and the Reading Comprehension Quotient from the TORC, the Reading Comprehension Quotient from the TORC and the five subtests from the TOLD-I, TORC subtests and the five language quotients from the TOLD-I, and the subtests from the TOLD-I and the TORC subtests. Spearman rho correlation coefficients were computed for a subgroup of eight subjects who had Spoken Language Quotients that fell below average. The variables identified for Spearman rho correlations were identical to those identified for Pearson Product Moment correlations.

The *t*-Test for a Difference Between a Sample Mean and the Population Mean (Bruning & Kintz, 1968) was used to compare the mean Spoken Language Quotient on the TOLD-I of the subjects from this study to the hypothetical mean Spoken Language Quotient of the norming sample used for the TOLD-I. This same statistical procedure was used to compare the mean Reading Comprehension Quotient on the TORC of the subjects from this study to the hypothetical mean Reading Comprehension Quotient of the norming sample used for the TORC.

CHAPTER IV

RESULTS

This study describes the verbal language and reading comprehension characteristics of a group of twelve fourth and fifth grade reading disabled children. Each of the subjects included in the study had adequate vision, hearing, visual perception, and normal intelligence. Verbal language was assessed with the Test of Language Development-Intermediate (TOLD-I) (Hammill & Newcomer, 1982). Reading comprehension was assessed with the Test of Reading Comprehension (TORC) (Brown, Hammill & Wiederholdt, 1978). The reporting of the results includes first, numerical and graphic descriptions of the verbal language and reading comprehension of the twelve subjects; second, correlations between verbal language and reading comprehension for the twelve subjects studied and for a subgroup of eight subjects with below average verbal language development; and third, a comparison of the verbal language and reading comprehension group means of the twelve subjects in this study to the projected appropriate mean from the norming samples used for the TOLD-I and TORC.

Numerical and Graphic Descriptions of Verbal Language and Reading Comprehension

The TORC reading comprehension quotient (RCQ) and the TOLD-I Spoken Language Quotient (SLQ), Listening Quotient (LiQ), Speaking Quotient (SpQ), Semantic Quotient (SeQ), and Syntax Quotient (SyQ) group means, medians, and standard deviations are shown in Table 1. Quotients derived from both the TORC and TOLD-I are comparable to intelligence quotients. The projected appropriate mean quotients for normal on the TORC and TOLD-I are 100, with one standard deviation equal to fifteen points. Any quotient that falls between 85 and 115 is within the normal range. Quotients above 115 are in the above average range, with quotients below 85 in the below average range. Both the RCQ mean of 75.91 and the SLQ mean of 79.91 are in the below average range. Similarly, the SpQ of 75.08 and the SyQ of 79.33 are in the below average range. The LiQ of 93.75 and SeQ of 87.75 are in the average range. Overall, these results show that as a group, the subjects are below average in reading comprehension and verbal language. The below average mean SpQ and SyQ are indicative of deficits in verbal expression, specifically, performance in syntax.

Figures 3,4,5, and 6 are graphic representations of the different results obtained from testing with the TORC

Table 1. Reading Comprehension (RCQ) (TORC), Spoken Language (SLQ), Listening (LiQ), Speaking (SpQ), Semantic (SeQ) and Syntax (SyQ) (TOLD-I) Quotient Means, Medians, and Standard Deviations.

	RCQ	SLQ	LiQ	SpQ	SeQ	SyQ
Mean	75.91	79.25	93.75	75.08	87.75	79.33
Median	76.0	78.0	94.0	75.0	88.0	77.5
Standard Deviation	8.93	7.21	8.12	7.52	8.16	7.97

and TOLD-I. Figure 3 is a comparison of individuals SLQ's from this study to the TOLD-I norms. Examination of Figure 3 reveals that subjects 01, 04, 06, 08, 09, 10, 11, and 12 scored below average, while subjects, 02, 03, 05, and 07 scored in the average range. Eight children scored low enough on the TOLD-I to be identified as a language disorder subgroup, while the other four children form a normal language subgroup.

Figure 4 is a graphic comparison of the RCQ's of the language disorder and normal language subgroups to the TORC norms. Within the language disorder subgroup, seven of the eight children received below average RCQ's, with one child scoring in the average range. Similarly, within the normal language subgroup, three of the four children obtained below average RCQ's, with one child scoring in the average range. Further analysis of the twelve childrens' RCQ's reveals that regardless of competence in verbal language, the majority of reading disabled children in this study demonstrated deficiencies in reading comprehension.

The number of subjects in the language disorder subgroup scoring at least one standard deviation below the mean scaled score of ten on each of the five TOLD-I subtests are presented graphically in Figure 5. The Sentence Combining subtest, which requires generation of a single complex sentence from two simple sentences spoken by

Figure 3. A Graphic Comparison of Individual Subject Spoken Language Quotients to TOLD-I Norms.

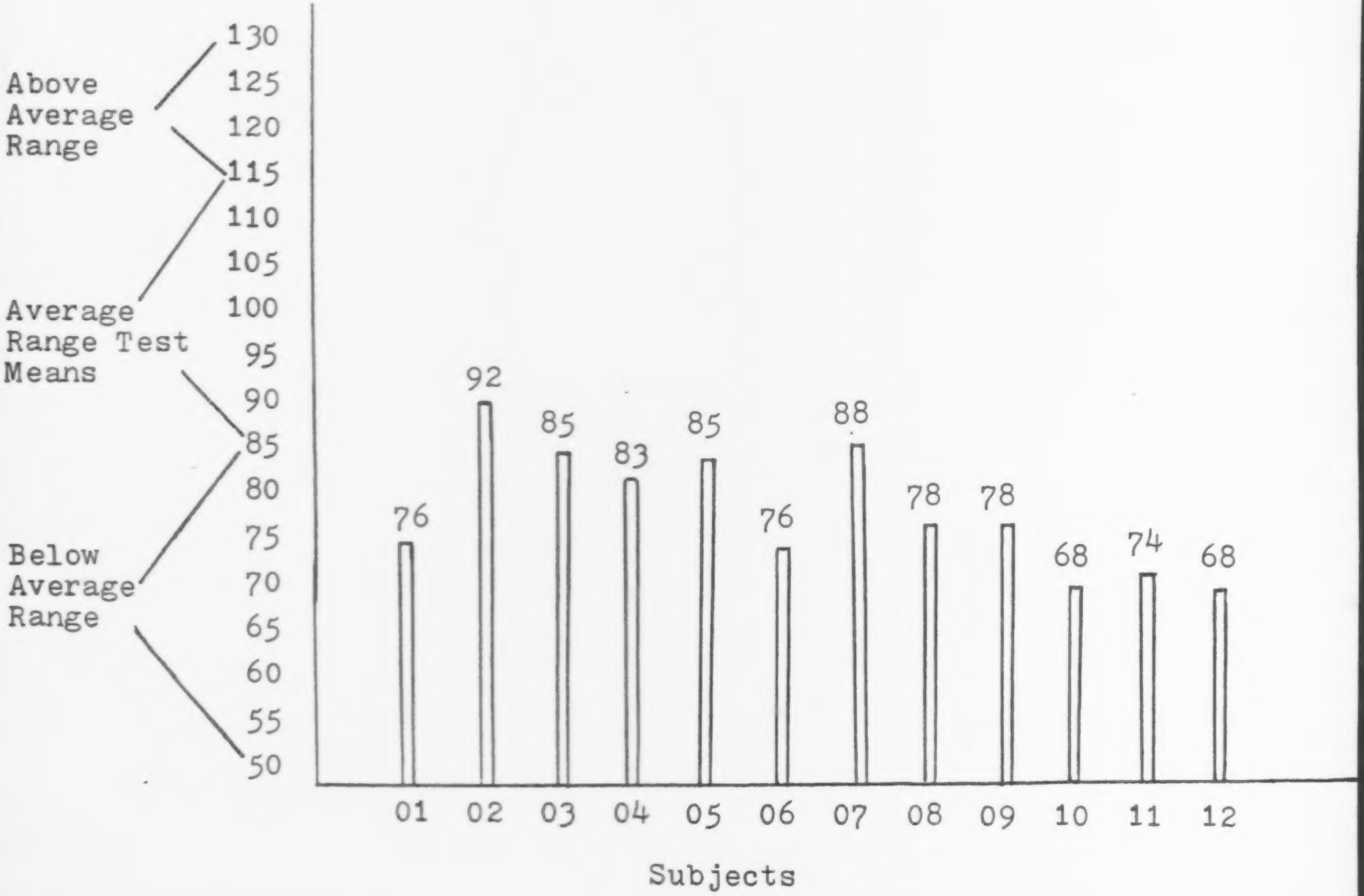
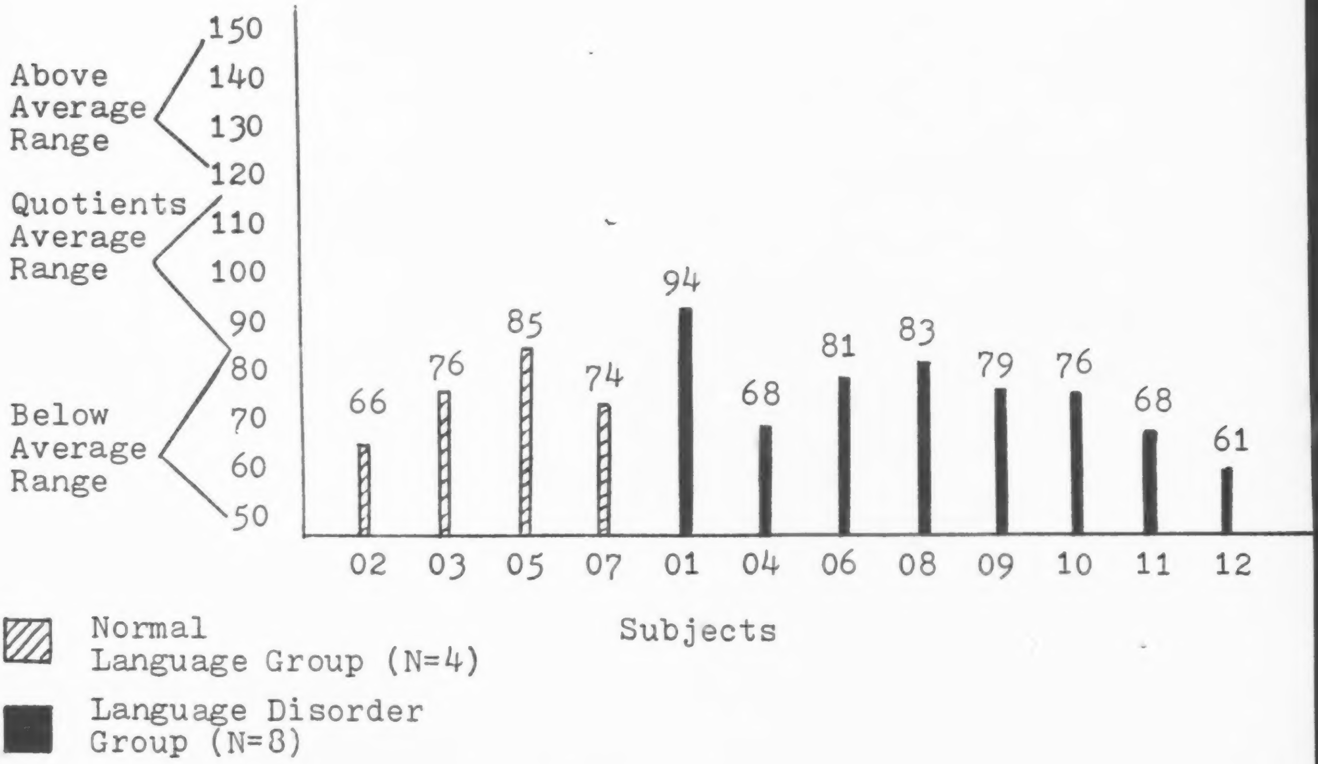


Figure 4. A Graphic Comparison of Reading Comprehension Quotients of the Language Disorder Subgroup and the Normal Language Subgroup to the TORC Norms.



an examiner, and the Word Ordering subtest, which requires correction of scrambled sentences spoken by an examiner, rank first and second in difficulty for the language disorder subjects. Thus the overriding characteristic of the language disorder subgroup is a deficiency in expressive syntax.

Figure 6 is a graphic comparison of the number of subjects in the normal language and verbal language subgroups who scored at least one standard deviation below the mean scaled score of ten on each of the five TORC subtests. For those in the normal language group, the General Vocabulary, Syntactic Similarities and Sentence Sequencing subtests proved to be the most difficult. Within the language disorder subgroup, the Syntactic Similarities, Sentence Sequencing, and Reading Directions were the most difficult. The General Vocabulary subtest requires reading and categorization of isolated words. The Syntactic Similarities, Sentence Sequencing, and Reading Directions Subtests all require ability to derive meaning from printed sentences of varying complexity. Comparison of the number of subjects scoring below average on the different reading comprehension subtests, shows the language disorder subgroup as a whole did poorer in reading comprehension then those in the normal language subgroup.

Figure 5. A Graphic Representation of the Number of Subjects In the Language Disorder Group Who Scored At Least One Standard Deviation Below the Test Mean on the Five TOLD-I Subtests.

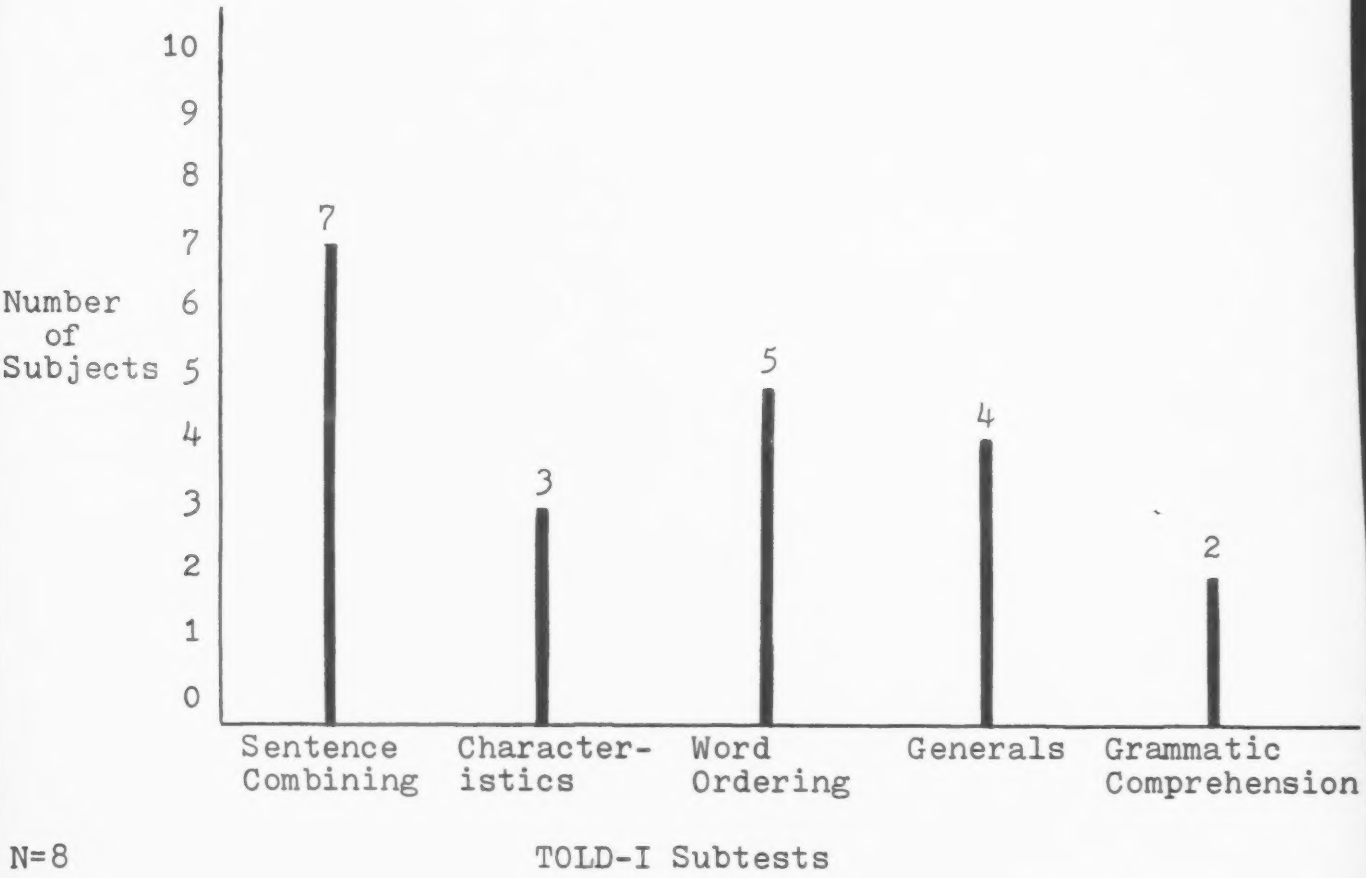
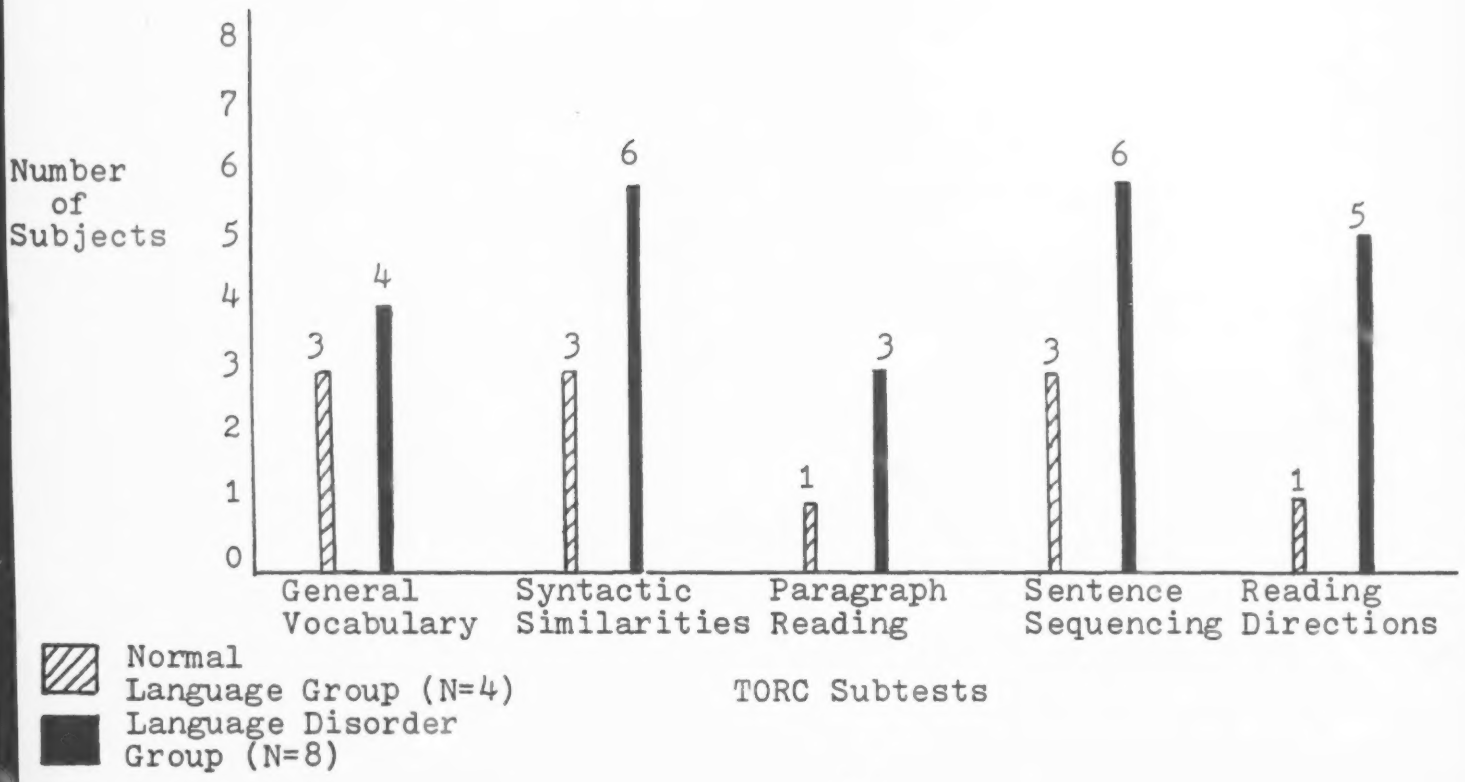


Figure 6. A Graphic Comparison of the Number of Subjects In the Normal Language Subgroup and Language Disorder Subgroup Who Scored At Least One Standard Deviation Below the Test Mean On the Five TORC Subtests.



Correlational Analyses

Tables 2,3,4, and 5 contain the Pearson Product-Moment correlation coefficients for the six reading comprehension and ten verbal language variables. Coefficients that did not reach an alpha level of .05 were not considered to symbolize a significant relationship between two variables. Table 2 shows no significant relationships between the TORC RCQ and the five TOLD-I quotients (SLQ, LiQ, SpQ, SeQ, SyQ). This signals no relationship between reading comprehension in general and verbal language in general. A breakdown of the TOLD-I into quotients representing the two modes and two parameters of verbal language reveals no association between reading comprehension and the four language variables. RCQ is derived by combining scores from the General Vocabulary, Syntactic Similarities and Paragraph Reading subtests. SLQ is derived by combining scores from the five TOLD-I subtests. LiQ is derived by combining scores from the Characteristics and Grammatic Comprehension subtests. SpQ is derived by combining scores from the Sentence Combining, Word Ordering, and Generals subtests. SeQ is derived by combining scores from the characteristics and Generals subtests. SyQ is derived by combining scores from the Sentence Combining, Word Ordering, and Grammatic Comprehension subtests.

Table 2. Product-Moment Correlations Between the Reading Comprehension Quotient (RCQ) (TORC) and the Spoken Language Quotient (SLQ), Listening Quotient (LiQ), Speaking Quotient (SpQ), Semantic Quotient (SeQ), and Syntax Quotient (SyQ) (TOLD-I).

TOLD-I Quotients	SLQ	LiQ	SpQ	SeQ	SyQ
RCQ	.00	-.05	.01	-.21	.10

Table 3. Product-Moment Correlations Between the Five Verbal Language Quotients (TOLD-I) and the Five Reading Comprehension Subtests (TORC).

	Language Quotients				
Reading Comp. Subtests	SLQ	LiQ	SpQ	SeQ	SyQ
Gen'l. Vocab.	.33	.18	.28	.16	.25
Syntactic Sim.	-.20	-.28	-.06	-.62*	.20
Par. Read.	-.19	-.15	-.15	-.33	-.03
Sen't. Seq.	.24	.17	.31	.28	.08
Read. Dir.	.22	.08	.22	.27	.04

Table 3 shows a significant negative correlation between the TORC Syntactic Similarities subtest and the TOLD-I Semantic Quotient. Such a coefficient indicates that as scores on one variable rose, scores on the other variable fell. Further examination of Table 3 reveals no relation between the TORC General Vocabulary, Syntactic Similarities, Paragraph Reading, Sentence Sequencing, and Reading Directions subtests and SLQ. This shows that none of the five TORC subtests are associated with spoken language in general. Even when spoken language was subdivided into its four component parts, no association between the individual TORC subtests and spoken language was obtained. The exception to this is the significant negative correlation described above.

Table 4 shows a significant negative correlation between the TORC Paragraph Reading subtests and the TOLD-I Sentence Combining subtests. This coefficient reflects an inverse relationship between comprehension of sentences that vary in number and ability to formulate and express complex sentences.

Table 5 shows no significant correlations between the TORC RCQ and the five TOLD-I subtests. However, there is a moderate negative correlation between RCQ and the Sentence Combining subtests. This reflects an inverse relationship between RCQ and scores on the Sentence Combining subtests. The other coefficients in Table 5 show no

Table 4. Product-Moment Correlations Between the Five Verbal Language Subtests (TOLD-I) and the Five Reading Comprehension Subtests (TORC).

	Verbal Language Subtests				
Reading Comprehension Subtests	Sen't. Combin.	Char.	Word Ordering	Gen'ls.	Gramm. Comp.
Gen'l. Vocab.	-.34	.12	.43	.10	.12
Syn. Sim.	-.20	-.45	.29	-.45	.08
Par. Read.	-.70*	-.28	.23	-.18	.09
Sen't. Seq.	.11	.32	.28	.04	.31
Read. Dir.	.14	.26	.25	.11	-.16

Table 5. Product-Moment Correlations Between the Reading Comprehension Quotient (RCQ) (TORC) and the Five Verbal Language Subtests (TOLD-I).

Verbal Language Subtests	Sen't. Combin.	Char.	Word Ordering	Gen'ls.	Gramm. Comp.
RCQ	-.56	-.22	.31	-.06	.15

association between RCQ and the Characteristics, Word Ordering, Generals, and Grammatic Comprehension subtests.

Spearman rho Correlations

Tables 6,7,8, and 9 contain the Spearman rho rank order correlation coefficients for the six reading comprehension and the ten verbal language variables for the language disorder subgroup. Spearman rho was chosen because of the small number of subjects in the language disorder subgroup. Coefficients had to reach an alpha level .05 to be considered to symbolize a significant relationship between two variables. Table 6 shows no significant relationships between the TORC RCQ and the five TOLD-I quotients.

Examination of Table 7 reveals a significant positive correlation between RCQ and the TOLD-I Word Ordering subtest. This indicates that as the RCQ changed, scores on the Word Ordering subtest followed in the same direction. This shows that reading comprehension in general is related to the ability to generate complex sentences from simple sentences. RCQ did not correlate significantly with any of the other TOLD-I subtests.

Table 8 shows a significant positive correlation between the TORC Syntactic Similarities subtest and SyQ. This coefficient means that scores on the Syntactic Similarities subtest and the SyQ changed in the same direction. There is also a significant negative correlation between the Syntactic Similarities subtest and SeQ. This coefficient is indicative of score and quotient movement in opposite directions. These correlations signify that spoken syntax (comprehension and expression) is related to comprehension of printed syntax. The semantic parameter of spoken language is not associated in a positive direction with comprehension of printed syntax.

Table 9 shows a significant positive correlation between the Paragraph Reading subtest and the Word Ordering subtest. This correlation reveals that scores on the Paragraph Reading subtest moved in the same direction as scores on the Word Ordering subtest. A significant negative correlation between the Paragraph Reading and Sentence Combining subtests was also found. Such a coefficient is indicative of an inverse relationship between scores on the two subtests. In addition, there is a moderate positive correlation between the General Vocabulary subtest and the Word Ordering subtest. It is probable that scores on the General Vocabulary and Word Ordering subtests changed in the same direction. The positive coefficients show that ability to comprehend isolated printed words and paragraphs is related to ability to produce spoken sentences that are grammatically appropriate. The negative coefficient signifies that ability to comprehend printed paragraphs is inversely related to ability in formulation and expression of complex sentences.

Table 6. Spearman rho Correlations Between the Reading Comprehension Quotient (RCQ) (TORC) and the Spoken Language Quotient (SLQ), Listening Quotient (LiQ), Speaking Quotient (SpQ), Semantic Quotient (SeQ), and the Syntax Quotient (SyQ) (TOLD-I).

TOLD-I Quotients	SLQ	LiQ	SpQ	SeQ	SyQ
RCQ	.34	.17	-.13	-.18	.41

Table 7. Spearman rho Correlations Between the Reading Comprehension Quotient (RCQ) (TORC) and the Five Verbal Language Subtests (TOLD-I).

Verbal Language Subtests	Sen't. Combin.	Char.	Word Ordering	Gen'ls.	Gramm. Comp.
RCQ	-.43	-.12	.65*	-.29	.27

*$p < .05$

Table 8. Spearman rho Correlations Between Five Quotients From the TOLD-I and Five Subtests From the TORC.

	TOLD-I Quotients				
TORC Subtests	Spoken Language Quotient	Listening Quotient	Speaking Quotient	Semantic Quotient	Syntax Quotient
General Vocabulary	.40	.24	-.12	.00	.25
Syntactic Similarities	-.37	-.36	-.10	-.79*	.64*
Paragraph Reading	.00	-.02	-.27	-.41	.20
Sentence Sequencing	.08	-.13	-.03	.10	-.27
Reading Directions	.22	.01	-.12	.10	-.20

* $p < .05$

Table 9. Spearman rho Correlations Between the Five TORC Subtests and the Five TOLD-I Subtests For the Language Disorder Group.

	Five TOLD-I Subtests				
Five TORC Subtests	Sen't. Combin.	Char.	Word Ordering	Gen'ls.	Gramm. Comp.
General Vocabulary	.44	-.02	.56	-.18	.26
Syntactic Similarities	-.01	-.51	.37	-.49	.03
Paragraph Reading	-.67*	-.30	.68*	-.45	.17
Sentence Sequencing	.03	.06	.20	-.14	-.32
Reading Directions	-.28	.10	.41	-.19	-.17

* $p < .05$

Inferential Statistical Analysis

The t-Test for a Difference Between a Sample Mean and the Population Mean (Bruning & Kintz, 1968) was chosen to compare the mean RCQ and mean SLQ of the twelve subjects in this study to the hypothetical mean quotient of 100 on the TORC and TOLD-I. An alpha level of .05 was chosen for these two comparisons. Table 10 contains results of the comparisons of the group mean RCQ and SLQ. When the mean RCQ of 75.91 and the mean SLQ of 79.25 were compared to the hypothetical mean quotient of 100 on the TORC and TOLD-I, t ratios of 9.02 for the RCQ and 10.22 for the SLQ were obtained. Both t ratios were significant at $p < .05$ (two tailed). As a result of these findings it can be assumed that the twelve subjects in this study make up a group that is altogether separate from the normal population in reading comprehension and verbal language. In both reading comprehension and verbal language, the group studied obtained RCQ's and SLQ's that were significantly lower than those obtained by the normal population.

Table 10. t-Test for Differences Between the Mean Spoken Language Quotient (TOLD-I) and the Mean Reading Comprehension Quotient (TORC) of the Twelve Subjects Studied and the TOLD-I and TORC Hypothetical Test Means.

	M (Study Group)	SD	M (Tests)	t
Spoken Language Quotient (TOLD-I)	79.25	7.21	100 (TOLD-I)	10.22*
Reading Comp. Quotient (TORC)	75.91	8.93	100 (TORC)	9.02*

*$p < .05$ (two tailed) (df = 11)

CHAPTER V

SUMMARY AND DISCUSSION

Summary

According to the literature reviewed in Chapter II, researchers have attempted to explain reading disabilities with singular and multiple causation theories. One group of early investigators (Hinshelwood, 1900; Orton, 1925) postulated that dyslexia was the result of a neurological dysfunction. More recent findings have identified verbal language disability as the cause of reading disability. (Denckla & Rudel, 1976; Donahue, Pearl & Brian, 1982; Hyatt, 1968; Idol-Maestas, 1981; Kass, 1962; Vellutino, Steger, Harding & Phillips, 1975; Vogel, 1975; Vent, 1971). Others have hypothesized the existence of different types of cognitive syndromes underlying reading disabilities (Boder, 1971; Bronner, 1919; Mattis, 1975; Monroe, 1932; Myklebust, 1965; Pirozzolo, 1979).

To date the research studies have not provided in-depth descriptions of both the reading comprehension and verbal language of disabled readers. This study utilized standardized testing procedures to identify the reading comprehension and verbal language characteristics of a group of fourth and fifth grade disabled readers. Thirty-one subjects were administered a group of screening tests and a study group of twelve reading disabled children with normal vision, hearing, intelligence, and visual perception was isolated. All participants were tested in quiet rooms at three Eugene area locations, University of Oregon Speech-Language-Hearing Center, Silver Lea School, and Meadowlark School. The results of the study are summarized below in response to the four research questions posed.

1) Is there a difference in the verbal language abilities of children who have reading problems and children with normal verbal language development on a standardized norm-referenced test of verbal language?

A mean Spoken Language Quotient (SLQ) for the twelve subjects in this study was derived from administration of the Test of Language Development-Intermediate (Hammill & Newcomer, 1982) (TOLD-I). Comparison of the study group mean SLQ to the TOLD-I projected appropriate mean SLQ for normal revealed the study group to be significantly poorer in spoken language than the linguistically normal children used to standardize the TOLD-I. Children with reading problems are delayed in the development of verbal language.

2) What are the verbal language characteristics of children with reading problems?

Eight of the twelve reading disabled children demonstrated below average ability in verbal language development while the other four demonstrated normal language development. A graphic representation of the number of children in the language disorder subgroup scoring one or more standard deviations below the test mean, revealed that more of the language disordered fell below average on the Sentence Combining and Word Ordering subtests than any of the other language subtests. The delay in verbal language development was manifested through below average performance in spoken syntax. Within a group of disabled readers, there will be a language disorder subgroup. This subgroup will be delayed in the development of expressive syntax.

3) What are the reading comprehension characteristics of children with reading problems?

A mean Reading Comprehension Quotient (RCQ) for the twelve subjects in this study was derived from administration of the Test of Reading Comprehension (Brown, Hammill & Wiederholdt, 1978) (TORC). Comparison of the study group mean RCQ to the TORC projected appropriate mean RCQ for normal readers revealed the subjects in this study to be significantly poorer in reading comprehension than the normal readers.

Of the twelve children tested with the TORC, ten obtained below average RCQ's. Graphic comparisons of the four linguistically normal subjects to the eight language disordered subjects on RCQ revealed three of the four linguistically normal subjects and seven of the eight language disordered subjects scored below average in reading comprehension. Graphic comparisons of the four linguistically normal and eight language disordered subjects on the number scoring one or more standard deviations below the test mean on the five TORC subtests were also made. The results of these comparisons showed that three of the four linguistically normal children scored below average on the General Vocabulary, Syntactic Similarities, and Sentence Sequencing subtests. Six of the eight language disordered subjects scored below average on the Syntactic Similarities and Sentence Sequencing subtests. Five of the eight language disordered subjects scored below average on the Reading Directions subtest. Reading disabled children will have difficulty with reading comprehension tasks that require the categorization of isolated words, comprehension and sequencing of printed sentences of varying levels of complexity, and comprehension of printed directions.

4) What is the relationship between reading comprehension and verbal language?

Pearson Product-Moment correlations between the reading comprehension and verbal language variables for the twelve subjects were computed. Intercorrelations between the five TORC subtests (General Vocabulary, Syntactic Similarities, Paragraph Reading, Sentence Sequencing, and Reading Directions), RCQ, the five TOLD-I language quotients (Spoken Language, Listening, Speaking, Semantic, and Syntactic), and the five TOLD-I subtests (Sentence Combining, Characteristics, Word Ordering, Generals, and Grammatic Comprehension) yielded sixty coefficients. Overall, the coefficients obtained showed no relationship between reading comprehension in general and verbal language in general. However, there were significant negative correlations between the TORC Syntactic Similarities subtests and the TOLD-I SeQ, and the TORC Paragraph Reading subtest and the TOLD-I Sentence Combining subtest. There was also a moderate negative correlation, although not significant, between RCQ and the TOLD-I Sentence Combining subtest. The negative correlations signify inverse relationships between ability to comprehend printed sentences and paragraphs and the semantic parameter of verbal language, and ability to generate complex sentences.

Spearman rho correlations between the sixteen reading comprehension and verbal language variables were computed for the eight subjects in the language disorder subgroup. Reading comprehension in general and verbal language in general were not significantly related. However, division of the TORC and TOLD-I into their component parts yielded three significant positive correlations, two significant negative correlations, and one moderate, although not significant, correlation. These correlations indicate that comprehension of printed sentences and paragraphs are positively related to ability in generation of grammatical sentences from ungrammatical sentences. Whereas there is an inverse relationship between comprehension of printed sentences and paragraphs, the semantic parameter of verbal language and ability to produce complex sentences. For reading disabled children in general and the reading disabled children with a language disorder, there is no relationship between reading comprehension and verbal language. There are inverse relationships between ability to comprehend printed sentences and paragraphs, the semantic parameter of verbal language and ability to generate complex sentences for reading disabled children. There are also inverse relationships between ability to comprehend printed sentences and paragraphs, the semantic parameter of verbal language and ability to produce complex sentences for reading disabled children with a language disorder. Further, positive significant relationships exist between ability to comprehend printed sentences and paragraphs and ability to generate grammatical from ungrammatical sentences for reading disabled children with a language disorder.

Discussion

Comparisons of the mean SLQ of the study group to the hypothetical mean SLQ on the TOLD-I yielded a statistically significant difference. This finding indicates that the reading disabled subjects studied have not attained the level of verbal language competence of their same aged peers. These results are consistent with the single causation theories of dyslexia postulated by

Myklebust (1978) and Vellutino (1979). Both of these authors have stated that dyslexia may be the result of a verbal language disorder. Research studies conducted by Denckla and Rudel (1976); Donahue, Pearl, and Brian (1982); Hyatt (1968); Kass (1962); Vellutino, Steger, Harding, and Phillips (1975); Vent (1971); and Vogel (1975) further support the verbal language disorder hypothesis of reading disabilities.

Such findings would be expected on the basis of reading being a linguistic process. Any child who is delayed in verbal language development will also have problems learning to read. Although such a generalization is appealing, it is too broad and simplistic. Vellutino (1979) has stated that although he favors a language disorder hypothesis for dyslexia, he is not certain whether dyslexia is due to a general delay in verbal language, or a delay in certain parameters of verbal language. Thus the language disorder hypothesis of reading disabilities must be reformulated so that it is more precise.

The results of this study enable a more precise definition of the type of language disorder underlying dyslexia. Comparison of the study group mean Listening, Speaking, Semantic, and Syntax quotients to the TOLD-I norms revealed a delay in verbal expression, specifically in spoken syntax.

Although the results of this study seem to favor a single causation theory of reading disability, further analysis of the data lend support to the multiple causation theory of reading disability. Aaron (1980) has stated that dyslexia is not a unitary syndrome, but rather the result of at least two different syndromes, each with different cognitive characteristics. The tests administered in this study clearly identified a language disorder subgroup, while they did not define any deficit that was specific to the other subgroup.

The failure of this study to clearly delineate more than one specific reading disability syndrome was likely due to the focus, description of the verbal language and reading comprehension of reading disabled children. There was no attempt from the outset to muster support for the multiple causation theory of dyslexia. A quote by Myklebust (1983) is the most plausible characterization of the findings of this study with regard to the multiple causation theory of dyslexia. He stated,

> Although these cognitive disturbances vary in character, they fall into two major categories. One precludes normal acquisition and use of language and the other causes imposition on nonlanguage aspects of learning and behavior-sometimes designated as disorders of social perception. (p.ix)

The paucity of significant positive correlations between reading comprehension and verbal language raises a further question about the broad scope of the language disorder hypothesis of reading disability. In order for such a hypothesis to be accurate there would have to be a strong relationship between all reading comprehension in general and verbal language in general. Such an all encompassing association was not found in this study. In fact, no significant positive correlations were found between any of the sixteen reading comprehension and verbal language variables for the study group when Pearson Product-Moment correlation was used.

When the sixteen reading comprehension and verbal language variables were correlated for the language disorder subgroup with Spearman rho correlations, only three significant positive coefficients were obtained. These were between reading comprehension tasks that require comprehension of printed sentences and paragraphs, and a verbal language task that requires generation of grammatical from ungrammatical sentences. The relationship between reading comprehension and verbal language for the language disorder subgroup is very specific.

There are two plausible explanations for the correlational findings. The first explanation is, if the study group had been larger, more positive significant correlations would have been obtained. The second explanation is, verbal language and reading are not the same. Hasenstab and Laughton (1982) have stated that printed language is not really the same as spoken language written down. The 1981 model of language by Muma shows that verbal language and reading are different types of linguistic endeavors that are indirectly related by mutual underlying cognitive-linguistic systems. Both explanations for the correlational results can be supported to a certain extent. Even though an increase in the number of subjects would raise the number of significant positive correlations, it would also raise the number of significant negative correlations. So no matter how many subjects are studied, the association between reading comprehension and verbal language for disabled readers will likely be indirect.

Although the relationship between certain aspects of reading comprehension and verbal language is more obvious for disabled readers with language disorders, this is likely due to delayed development of one or more verbal language parameters that are directly tied to reading comprehension. Such a notion is supported by the results of this study. The language disorder subgroup demonstrated delayed development of expressive syntax and problems with comprehending printed sentences and paragraphs.

The finding that the reading disabled children scored significantly lower in reading comprehension than normal readers would be expected due to the presence of a reading disability. However, examination of individual RCQ's revealed two subjects with average ability in reading comprehension, one from the normal language subgroup and one from the language disorder subgroup. It is evident from the results that reading disabilities differ in kind, even within a group of twelve reading disabled children.

One of the findings in reading comprehension specific to the language disorder subgroup was a deficit in comprehension of printed directions. These children could not be expected to succeed in school assignments that require accurate reading of printed directions. Such an ability is a requisite to academic success, even in the first grade.

Application of the Study Results

1) Any child referred for diagnosis of a reading disability should be evaluated by a Speech-Language Pathologist to isolate those reading disabled children with a language disorder. Those children who are identified as reading disabled and language disordered consistent with weakness should receive remedial language services as well as remedial reading services.

2) Since the development of expressive syntax is delayed in upper elementary grade reading disabled children with a language disorder, this parameter of verbal language should be a major focus of any remedial language program used with this type of child.

3) Remedial Reading Specialists and/or Resource Room Teachers should be aware that reading disabled children with a language disorder are likely to have problems with

comprehension of printed directions. Remedial reading programs should include programming to improve comprehension of printed directions.

4) Remedial Reading Specialists and/or Resource Room Teachers should be aware that the majority of upper grade reading disabled children will have reading comprehension problems in the areas of vocabulary and syntax. Remedial reading programs should include specific instruction in the meaning of individual words and derivation of meaning from different types of sentences, i.e., question, exclamation, etc.

Recommendations For Future Research

Continued research with reading disabled upper elementary grade children in the areas of reading comprehension and verbal language is needed. The following research studies are recommended:

1) Extend this study to include a large population of reading disabled fourth and fifth grade children in order to identify further correlations between reading comprehension and verbal language.

2) Identify those syntactic forms, structures, and phrase structures of verbal language not developed by fourth and fifth grade reading disabled children with a language disorder. Such a study would provide specific remedial targets for this population that were not

identified in the present investigation. The language assessment procedure developed by Crystal, D., Fletcher, P., and Garman, M. (1976) might be used in such an investigation as it provides standardized procedures for collecting and analyzing the syntax of school age children.

Conclusions of the Study

Based on the results of this investigation and those of the related studies summarized in Chapter II, the following conclusions are warranted:

1) Upper elementary grade reading disabled children are likely to exhibit a verbal language disorder.

2) The majority of disabled readers, regardless of subgroup membership, will exhibit below average capabilities in reading comprehension.

3) Disabled readers with a language disorder will have problems in verbal language expression, specifically with the syntactic parameter of verbal language.

4) A meaningful relationship between certain aspects of the syntactic parameter of verbal language and the ability to comprehend printed sentences and paragraphs of various complexities and lengths, was found.

APPENDIX A

ADVERTISEMENT FOR SUBJECTS

ATTENTION

Parents of children with reading problems in grades four and five. I will provide language and reading assessments at no cost in exchange for your child's participation in my doctoral study.

Contact: John Tracy
Center on Human Development
University of Oregon
686-3591 or if no answer, 683-8301

Advertisement for subjects to be placed in the Register-Guard newspaper.

APPENDIX B

PARENT INFORMATION LETTER - EUGENE PUBLIC SCHOOLS RESEARCH DEPARTMENT

UNIVERSITY OF OREGON

June 2, 1982

Dear Parent:

I am a doctoral student in the Dept. of Speech Pathology and Audiology at the University of Oregon with an interest in school aged children with reading problems. Children with reading difficulties are all different. Researchers have found that there are many different reasons for a reading problem. Educators know that there is no single most effective reading program for all children with reading handicaps.

The purpose of my doctoral research is to find out what the reading, speaking, and listening characteristics are of a special group of children with reading problems. The results of my findings will aid educators in designing reading programs to better fit the learning needs of this special group.

Approval of your child's participation in the study will allow me to administer a group of tests to identify the characteristics of his/her reading, speaking, and listening abilities. The testing will include vision and hearing screening tests, a verbal language test, an intelligence screening test, a reading screening test, three parts of the Wechsler Intelligence Scale for Children, and a reading comprehension test. I will also ask you to answer questions about your child's school placement and whether he/she has repeated any grades. At the conclusion of testing, which may require three one-hour sessions, I will discuss the results with you. You will also be provided with a printed copy of the test results.

Participation in the study will require you to transport your child to and from the University of Oregon Speech-Language-Hearing Center (18th & Alder Streets) for three separate testing sessions. Each testing appointment will last approximately one hour. The testing will be done by myself or other qualified professionals under my supervision. All test results will be kept confidential. Your child will be assigned a number so that during the analysis of the results and the later sharing of the findings, there will be no way to identify an individual child. Participation in the study will require your child to complete the testing. No child will be asked to perform any potentially harmful or dangerous activity. Also, at anytime during the testing you may withdraw your consent for your child's participation.

If you have any questions feel free to call me. My work number is 686-3591. I can also be reached at home, 683-8301.

If you agree to participate please sign the attached form.

Sincerely,

John M. Tracy, M.S.,CCC-SP
Doctoral Student

SPEECH PATHOLOGY AND AUDIOLOGY • DIVISION OF SPECIAL EDUCATION AND REHABILITATION
COLLEGE OF EDUCATION
CLINICAL SERVICES BUILDING • EUGENE, OREGON 97403-1211 • TELEPHONE (503) 686-3591

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APPENDIX C

PARENT INFORMATION LETTER AND CONSENT FORM - SILVER LEA SCHOOL

Speech Pathology and Audiology
Division of Special Education
and Rehabilitation

UNIVERSITY OF OREGON
[illegible]
Eugene, Oregon [illegible]

[illegible]

October 4, 1982

Dear Parent:

I am a doctoral student in the Department of Speech Pathology and Audiology at the University of Oregon with an interest in school-aged children experiencing some difficulty in reading. Researchers have found that there are many different reasons that impede a child's progress in reading.

The purpose of my doctoral research is to find out what the reading, speaking, and listening characteristics are of a special group of children with reading problems. The results of my findings will aid educators in designing reading programs to better fit the learning needs of this special group.

In order to identify the characteristics of your child's reading, speaking, and listening I will need to administer a group of tests. The testing will include a hearing screening, a verbal language test, an intelligence screening test (if the child has not had an intelligence test), three parts of the Weschler Intelligence Scale for Children, and a reading comprehension test. At the conclusion of testing, which may require one 1½ hour session, I will discuss the results with the Reading Specialist at Silver Lea School. A printed copy of the test results will be provided to the Reading Specialist.

All testing will take place at Silver Lea School. All test results will be kept confidential. Your child will be assigned a number so that during the analysis of the results and later sharing of the findings, there will be no way to identify an individual child. Participation in the study will require your child to complete the testing. No child will be asked to perform any potentially harmful or dangerous activity. Also, at anytime you may withdraw your consent for your child's participation.

Please check the appropriate box on the next page, sign and date this form and return to Marty Madden at Silver Lea School in the stamped self-addressed envelope. If you wish further information on my project call Marty at Silver Lea School.

Thank you for considering my request.

Sincerely,

John M. Tracy, M.S., CCC-SP
Doctoral Student

an equal opportunity/affirmative action institution

Speech Pathology and Audiology
Division of Special Education
and Rehabilitation
UNIVERSITY OF OREGON
901 E. 18th Avenue
Eugene, Oregon 97403
503 [illegible]

___ I have read the description of the research project.

___ I understand this project and will allow my child to participate.

___ I understand this project and will not allow my child to participate.

Signed: ______________________________

Date: ______________________________

If you would like to observe the testing and have a copy of the test results this can be arranged. Please write in some dates and times below when you would be available during school-time hours.

____

____

____

____

an equal opportunity/affirmative action institution

APPENDIX D

PARENT INFORMATION LETTER AND CONSENT FORM - MEADOWLARK SCHOOL

Speech Pathology [illegible]
Division of Spec[illegible]
and Rehabilitation
UNIVERSITY OF OREGON
[illegible]
Eugene, Oreg[illegible]
[illegible]

November 16, 1982

Dear Parent:

I am a doctoral student in the Department of Speech Pathology and Audiology at the University of Oregon with an interest in school-aged children experiencing some difficulty in reading. Researchers have found that there are many different reasons that impede a child's progress in reading.

The purpose of my doctoral research is to find out what the reading, speaking, and listening characterisitcs are of a special group of children with reading problems. The results of my findings will aid educators in designing reading programs to better fit the learning needs of this special group.

In order to identify the characteristics of your child's reading, speaking, and listening I will need to administer a group of tests. The testing will include a hearing screening, a verbal language test, an intelligence screening test (if the child has not had an intelligence test), three parts of the Wechsler Intelligence Scale for Children, and a reading comprehension test. At the conclusion of testing, which may require 1½ hours, I will discuss the results with your child's teacher at Meadlowlark School. A printed copy of the test results will be provided to the teacher.

All testing will take place at Meadowlark School. All test results will be kept confidential. Your child will be assigned a number so that during the analysis of the results and later sharing of the findings, there will be no way to identify an individual child. Participation in the study will require your child to complete the testing. No child will be asked to perform any potentially harmful or dangerous activity. Also, at anytime you may withdraw your consent for your child's participation.

Please check the appropriate box on the next page, sign and date this form and return to Darby Giannone at Meadowlark School in the stamped self-addressed envelope. If you wish further information on my project call Darby at Meadowlark School.

Thank you for considering my request.

Sincerely,

John M. Tracy, M.S., CCC-SP
Doctoral Student

an equal opportunity/affirmative action institution

[illegible]
[illegible]
[illegible]

UNIVERSITY OF OREGON
[illegible]
[illegible]

[illegible]

___ I have read the description of the research project.

___ I understand this project and will allow my child to participate.

___ I understand this project and will not allow my child to participate.

Signed: ______________________________

Date: ______________________________

If you would like to observe the testing and have a copy of the test results this can be arranged. Please write in some dates and times below when you would be available during school-time hours.

____

____

____

____

an equal opportunity/affirmative action institution

APPENDIX E

PARENT INFORMATION LETTER AND CONSENT FORM - UNIVERSITY OF OREGON SPEECH - LANGUAGE - HEARING CENTER

UNIVERSITY OF OREGON

June 2, 1982

Dear Parent:

I am a doctoral student in the Dept. of Speech Pathology and Audiology at the University of Oregon with an interest in school aged children with reading problems. Children with reading difficulties are all different. Researchers have found that there are many different reasons for a reading problem. Educators know that there is no single most effective reading program for all children with reading handicaps.

The purpose of my doctoral research is to find out what the reading, speaking, and listening characteristics are of a special group of children with reading problems. The results of my findings will aid educators in designing reading programs to better fit the learning needs of this special group.

Approval of your child's participation in the study will allow me to administer a group of tests to identify the characteristics of his/her reading, speaking, and listening abilities. The testing will include vision and hearing screening tests, a verbal language test, an intelligence screening test, a reading screening test, three parts of the Wechsler Intelligence Scale for Children, and a reading comprehension test. I will also ask you to answer questions about your child's school placement and whether he/she has repeated any grades. At the conclusion of testing, which may require three one-hour sessions, I will discuss the results with you. You will also be provided with a printed copy of the test results.

Participation in the study will require you to transport your child to and from the University of Oregon Speech-Language-Hearing Center (13th & Alder Streets) for three separate testing sessions. Each testing appointment will last approximately one hour. The testing will be done by myself or other qualified professionals under my supervision. All test results will be kept confidential. Your child will be assigned a number so that during the analysis of the results and the later sharing of the findings, there will be no way to identify an individual child. Participation in the study will require your child to complete the testing. No child will be asked to perform any potentially harmful or dangerous activity. Also, at anytime during the testing you may withdraw your consent for your child's participation.

If you have any questions feel free to call me. My work number is 686-3591. I can also be reached at home, 683-8301.

If you agree to participate please sign the attached form.

Sincerely,

John M. Tracy, M.S.,CCC-SP
Doctoral Student

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COLLEGE OF EDUCATION
CLINICAL SERVICES BUILDING • EUGENE, OREGON 97403-1211 • TELEPHONE (503) 686-3591

CONSENT FORM

* I have read the description of the research project. I understand this project and will allow my child to participate. ____________

* I have read the description of the research project. I understand this project and will not allow my child to participate.

Signed: ______________________________
(Parent or Guardian)

Date: ______________________________

APPENDIX F

VISION SCREENING QUESTIONNAIRE

VISION SCREENING QUESTIONNAIRE

Name: ______________________________ Screening Date: ______

Parent's Names: ____

I. Vision Screening: Have the parent answer the questions below. Place a check in the box under the yes or no columns. (Passing 13/13 in NO column)

		YES	NO
1.	Are the child's eyes constantly reddened?	___	___
2.	Are the child's eyelids heavily crusted with matter?	___	___
3.	Does the child complain of constant headache?	___	___
4.	Does the child complain of burning or itching eyes after reading?	___	___
5.	Does the child complain of print becoming blurred after short periods of reading?	___	___
6.	Does the child complain of seeing double?	___	___
7.	Does the child need to hold his/her book closer than normal during reading?	___	___
8.	Does the child blink his/her eyes more than normal while reading?	___	___
9.	Does the child blink or squint to see the television?	___	___
10.	Does the child hold the book far away from his/her face when reading?	___	___
11.	Does the child rub his/her eyes frequently?	___	___
12.	Does the child squint when reading?	___	___
13.	Does the child cover either eye while reading?	___	___

APPENDIX G

SUBJECT COMPOSITE SCORE SHEET

SUBJECT COMPOSITE SCORE SHEET

Identifying Information

Name: ____________________ Screening Date: ____________

Parent's Names: ____________________

D.O.B. ___________ Age at Testing ___________

Grade ___________ School __________________

Screening Results

I Vision Screening:

Passed ___ Failed ___ Referred ___

II Hearing Screening:

Passed ___ Failed ___ Referred ___

III S.I.T. (Slosson Intelligence Test)

Intelligence Quotient ___________

IV S.O.R.T. (Slosson Oral Reading Test)

Reading Grade Level ___________

Current Grade Level ___________

Referred because of reading problems ___________

Language Evaluation

(Test of Language Development-Intermediate)

	Raw Scores	Age Scores	%tile Scores	Stnd. Scores
Sentence Combining	___	___	___	___
Characteristics	___	___	___	___
Word Ordering	___	___	___	___
Generals	___	___	___	___
Gram. Comp.	___	___	___	___

Spoken Lang. Q.: ___ Listening Q.: ___ Speaking Q.: ___

Semantic Q.: ___ Syntax Q.,: ___ *Q = Quotient

Perceptual Evaluation

(Wechsler Intelligence Scale for Children-Revised)

Picture Completion: Avg. Scaled Score ____

Scaled Score _____

Block Design:

Scaled Score _____

Object Assembly:

Scaled Score _____

Reading Comprehension

(Test of Reading Comprehension)

Subtests	Raw Scores	Age Scores	%tiles	Scaled Scores
General Vocabulary	____	____	____	____
Syntactic Similarities	____	____	____	____
Paragraph Reading	____	____	____	____
Reading the Directions of Schoolwork	____	____	____	____
Sentence Sequences	____	____	____	____

Total Reading Comp. Scaled Score __________ RCQ ________

Q = Quotient

APPENDIX H

INSERVICE CONTENT

INSERVICE CONTENT

I. Step 1: Consent Form and Parent Questionnaire:

II. Step 2: Acuity Screening:

  A.) Visual acuity questionnaire

  B.) Auditory acuity screening

III. Intelligence Screening:

  A.) Overview of Slosson Intelligence Test (SIT)

  B.) Procedures for SIT administration and scoring

  C.) Practice with SIT

IV. Reading Test:

  A.) Overview of the Slosson Oral Reading Test (SORT)

  B.) Procedures for SORT Administration

  C.) Practice with SORT

V. Project Screening Test Form:

VI. Parent Feedback Procedures:

  A.) Child fails any of screening tests

  B.) Child passes all screening tests

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